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Research Cites

This is where the majority of not only affirmative, but also negative research should begin:

<http://journalofcosmology.com/Contents12.html>

additionally:

Aff – the Zubrin article is particularly good and has good references you should dig up.

Also, cut an impact to the developing countries add-on, it could seriously be a very could advantage.

Neg – most of these articles also contain negative arguments, as well as the Robinson article in particular.

Mars 1AC – Inherency

Observation 1 is Inherency

No missions to Mars are planned – lack of consensus among the community – now is the key time to streamline a purpose.

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 6/20/11 MG

Despite this apparent compatibility of visions of Mars, plans to sent astronauts to Mars have repeatedly failed. The Constellation Program is only the most recent Mars project to come up short. Wernher von Braun championed the idea of human Mars expeditions in the 1950s, followed by the Project EMPIRE study of the 1960s, the Space Task Group plan of the1970s, the Space Exploration Initiative in the 1990s, and the Vision for Space Exploration in 2000s. For those looking to place boots on Mars, NASA seems to be drifting in a Sargasso Sea of underfunded programs and policy revisions, never able to chart its course for the New World.(von Braun 1952, NASA 1989). 2. The Failure of Human Programs What explains the failure of human Mars programs? There are many answers. The lack of sustained commitment in the executive branch, the fickle nature of Congress, and the capricious interest of the public are routinely cited as causes. Yet this blame is misplaced. Lukewarm support for human spaceflight has been the rule rather than the exception over the past fifty years. As such, it should not be seen as the cause, but as the climate in which Mars programs must adapt to operate (Launius 2010). Instead, the key problem exists within the space community itself: a basic disagreement over the meaning and purpose of Mars exploration. While the compatibility of different visions of Mars – as a place of science and human exploration – is real, it is paper-thin. Consensus over aims is easy to attain when the basket of goals is broad; science, national prestige, and human progress are all popular motives for exploring Mars. Yet these goals routinely come into conflict. Expensive missions and tight federal budgets force choices over the goals of Mars exploration. While most members of the space community would embrace the set of goals as a whole, they tend to be committed to one goal far more strongly than the others.

Mars 1AC – Plan

Plan: The United States federal government should provide all necessary funding to the National Aeronautics and Space Administration for a human mission to establish United States colonies on Mars.

Mars 1AC – GOTR Adv (1/2)

Advantage \_\_ is Get Off The Rock!

First, extinction is inevitable unless we spread out to other planets – we’ll isolate a few impacts:

1. Asteroid Collision and Nuclear War

Stephen Hawking, 2006 (World Reknowned Physicist, all around great guy) [www.msnbc.msn.com/.../hawking-**humans**-**must**-**colonize**-**other**-**planets**/](http://www.msnbc.msn.com/.../hawking-humans-must-colonize-other-planets/) DOA: 6/20/11

Humans must colonize planets in other solar systems — traveling there using "Star Trek"-style propulsion — or face extinction, renowned British cosmologist Stephen Hawking said Thursday. Referring to complex theories and the speed of light, Hawking, the wheelchair-using Cambridge University physicist, told BBC radio that theoretical advances could revolutionize the velocity of space [travel](http://www.msnbc.msn.com/id/15970232/ns/technology_and_science-science/t/hawking-humans-must-colonize-other-planets/) and make such colonies possible "Sooner or later disasters such as an asteroid collision or a nuclear war could wipe us all out," said Professor Hawking, who was disabled by a muscle disease at the age of 21 and who speaks through a computerized voice synthesizer. "But once we spread out into space and establish independent colonies, our future should be safe," said Hawking, who received the world's oldest award for scientific achievement, the Copley Medal, from Britain's Royal Society on Thursday. Previous winners include Albert Einstein, Charles Darwin, Louis Pasteur and Capt. James Cook.

1. Solar expansion

Mitchell and Staretz 2010 Edgar D. Mitchell, Sc.D.1, Robert Staretz, M.S., October-November, 2010, Journal of Cosmology, <http://journalofcosmology.com/Mars104.html>. Mitchel is the Apollo 14 Lunar module pilot. Sixth person to walk on the Moon. “Our Destiny – A Space Faring Civilization?” DOA: 6/20/11

There are many other reasons to travel to other worlds and beyond besides the urge to explore the unknown. One is the obvious long term motivation to become an inter-stellar space faring civilization. At some point in the distant future we will have no choice but to leave our home world. Our sun, already a middle aged star, is powered by fusing hydrogen in the nuclear inferno at its core. As the remaining fuel is consumed, the sun will continue to expand in size and with it the intensity of the radiation increasing at the planets. Already the sun’s output is 15% greater than it was a few billion years ago and eventually it will destroy all life on the planet. The long term prognosis is that the sun will expand to such a large degree that in due course it will cause our oceans to boil away into the vacuum of space leaving an uninhabitable desert wasteland behind.

1. Global Warming

Stein editor for The Guardian 06 **(**David, Science, 2006, “Global Warming Xtra: Scientists warn about Antarctic melting,” http://www.agoracosmopolitan.com/home/Frontpage/2008/07/14/02463.html)

Global Warming continues to be approaches by governments as a "luxury" item, rather than a matter of basic human survival. Humanity is being taken to its destruction by a greed-driven elite. These elites, which include 'Big Oil' and other related interests, are intoxicated by "the high" of pursuing ego-driven power, in a comparable manner to drug addicts who pursue an elusive "high", irrespective of the threat of pursuing that "high" poses to their own basic survival, and the security of others. Global Warming and the pre-emptive war against Iraq are part of the same self-destructive prism of a political-military-industrial complex, which is on a path of mass planetary destruction, backed by techniques of mass-deception."The scientific debate about human induced global warming is over but policy makers - let alone the happily shopping general public - still seem to not understand the scope of the impending tragedy. Global warming isn't just warmer temperatures, heat waves, melting ice and threatened polar bears. Scientific understanding increasingly points to runaway global warming leading to human extinction", reported Bill Henderson in *CrossCurrents*. If strict global environmental security measures are not immediately put in place to keep further emissions of greenhouse gases out of the atmosphere we are looking at the death of billions, the end of civilization as we know it and in all probability the end of humankind's several million year old existence, along with the extinction of most flora and fauna beloved to man in the world we share.

Mars 1AC – GOTR Adv (2/2)

The plan provides critical lessons in ecological sustainability that are needed prevent ecological overshoot on earth

Mitchell and Staretz 2010 Edgar D. Mitchell, Sc.D.1, Robert Staretz, M.S., October-November, 2010, Journal of Cosmology, <http://journalofcosmology.com/Mars104.html>. Mitchel is the Apollo 14 Lunar module pilot. Sixth person to walk on the Moon. “Our Destiny – A Space Faring Civilization?” DOA: 6/21/11

The visionary Buckminister Fuller often referred to our planet as “Spaceship Earth”. It was his firm belief that we must all work together as a crew of Spaceship Earth if we are to survive let alone continue to thrive upon it, along with all other living creatures that share our beautiful planet. The available evidence suggests that global population growth fueled by our modern technologies of the last 100 years have created an unsustainable trajectory for all life on the planet. Our unprecedented consumption of nonrenewable resources and increasingly strong indications of run-away climate change have been greatly exacerbated by human activity of the last century. Together these factors suggest that we may soon be facing our first mass extinction event due to human activities. All previous extinction events have resulted from natural causes such as large meteor impacts or super-volcanic eruptions. Are we about to experience one due to our own inattentionand misperceptions of how nature has maintained Earth’s environment over its entire history by our propensity to interrupt her natural processes on a massive scale? Exploiting resources of the solar system, creating colonies in space, exploration of other planets, establishing colonies on them and eventually travel to other star systems offers us many lessons for a sustainable Earth although initially on a much smaller scale. Of necessity space colonies will have to be mostly self sufficient because of the vast distances from Earth. Aside from the long travel times to reach these remote outposts, the associated costs of shipping supplies and replacements parts will be prohibitively expensive. Our space colonies will be forced to live as close to self sufficiency as possible by utilizing local resources whenever practical. They will also have to make extensive use of recycling, reusing discarded materials and reducing consumption on a scale that has here-to-for been unprecedented. In a very real sense, space colonies will have to emulate consciously what nature has been doing for billions of years on Earth.

The plan makes all other forms of exploration more possible

Netea 2010 Mihai G. Netea, Ph.D.1,2, Frank L. van de Veerdonk, Ph.D.1,2,  Marc Strous, Ph.D.2,3, and Jos W.M. van der Meer, Ph.D.1,2,  1Department of Medicine and 2Nijmegen Institute for Infection, Inflammation and Immunity (N4i), Radboud University Nijmegen Medical Center, Nijmegen, The Netherlands.  3Max Planck Institute for Marine Microbiology, Bremen, Germany, Journal of Cosmology, October-November, 2010, Infection Risk of a Human Mission to Mars, <http://journalofcosmology.com/Mars129.html>: DAO 6/21/11

"Space junk" has already become a problem and poses dangerous and potentiality catastrophic risks to astronauts. Species destruction and environmental damage is also more or less uncontrolled (Ceballos et al., 2010; Cains 2010; Moriarty and Honnery 2010; Reese, 2010; Trainer 2010). Many believe we are facing a 6th extinction crisis (Ceballos et al., 2010; McKee 2010; Jones 2009; Tonn 2010). Clearly our existing moral principles when it comes to life and the environment are far from ideal. Perhaps we should be careful not to continue exploring space based on the same values we employ on Earth. One important benefit of space exploration could, therefore, be philosophical in nature: developing a sustainable model of exploration and exploitation of environments. Jacques Arnould and André Debus have argued that ethics is in some sense the next frontier of space exploration (Arnould & Debus 2008).

Mars exploration solves extinction

Owens and Fitzpatrick ‘2006Mars Science and Exploration Working Group. ngec.arc.nasa.gov/files/ngec\_proceedings/working\_groups/MarsScienceWGreport.pdf

Earth is currently challenged environmentally, socio-economically, and by the potential threat of a large asteroid impact. Each of these challenges could threaten the survivability of humanity. Human habitation of Mars would decrease the probability of extinction of our species, and promote and encourage the further spreading of humanity’s seed beyond its cradle.

Mars 1AC – Inspiration Adv (1/3)

Advantage \_\_ is Inspiration

**Trends show fewer Americans are entering into the science community – by 2015, we’ll have completely lost our edge – means the plan is key to jumpstarting the science sector.**

Towsend, Kerrick and Turpen 2009 [Frances Fragos Townsend, Co-Chair, Former Assistant to President Bush for Homeland Security and Counterterrorism, Lt. Gen. (Ret.) Donald Kerrick, Co-Chair Former Deputy National Security Advisor to President Clinton, Elizabeth Turpen, Ph.D., Project Director, Senior Associate, The Henry L. Stimson Center and Task Force “Leveraging Science for Security: A Strategy for the Nuclear Weapons Laboratories in the 21st Century” Stimson Center: March 2009] MG

Among the dominant challenges confronting the nation in the 21 century is the decline of the United States’ leadership role in science and technology – termed a “quiet crisis” by journalist and commentator Thomas Friedman. In the past few years, the United States has been slipping precipitously from its long-dominant position in an increasingly global and competitive S&T enterprise. Countries like China and India have made significant gains in technology innovation and in attracting high-technology and e- commerce opportunities. These governments are making substantial investments to build up their technical education systems and attract talent to their countries. In addition, they have focused heavily on their national research and development (R&D) infrastructures by paying special attention to harvesting their domestic S&T knowledge and talent base within research institutes and universities and by prioritizing their respective engineering, manufacturing, and Information Technology (IT) industries.2 The rise in global S&T competence sharply contrasts with the accelerating – and parallel – decline of the United States’ comparative advantage in knowledge discovery and innovation. Although according to all indices, the US still maintains the strongest innovation system in the world, that lead is expected to shrink dramatically by 2015, particularly when compared to the developing economies of China and India. Both governments have prioritized the enhancement of their R&D capabilities and have gone to great lengths to establish comprehensive, government-sponsored supportive frameworks. Indeed, by 2015, this component – at just 70% of what is considered optimal for any country – will be the weakest link in the US innovation system.3 Similarly, in the area of human capital, the US is expected to witness the erosion of its pre-eminence. A recent government-commissioned study predicts a mere 2% improvement US S&T talent, with China and India benefiting from a rise of 19% and 15% respectively.4 Such trends extend beyond the BRIC (Brazil, Russia, India, and China) economies to include many countries in the developing world.

Two Scenarios – the first is short term effects. Human exploration of Mars immediately generates **numerous tech spin-offs that solve resource scarcity, increase international cooperation, and cure disease.**

Rampelotto 2011 (Pabulo Henrique, Department of Biology, Federal University of Santa Maria (UFSM), Brazil, “Why Send Humans to Mars? Looking Beyond Science”) <http://journalofcosmology.com/Mars151.html> DOA: 6/20/11

The engineering challenges necessary to accomplish the human exploration of Mars will stimulate the global industrial machine and the human mind to think innovatively and continue to operate on the edge of technological possibility. Numerous technological spin-offs will be generated during such a project, and it will require the reduction or elimination of boundaries to collaboration among the scientific community. Exploration will also foster the incredible ingenuity necessary to develop technologies required to accomplish something so vast in scope and complexity. The benefits from this endeavor are by nature unknown at this time, but evidence of the benefits from space ventures undertaken thus far point to drastic improvement to daily life and potential benefits to humanity as whole. One example could come from the development of water recycling technologies designed to sustain a closed-loop life support system of several people for months or even years at a time (necessary if a human mission to Mars is attempted). This technology could then be applied to drought sufferers across the world or remote settlements that exist far from the safety net of mainstream society. The permanence of humans in a hostile environment like on Mars will require careful use of local resources. This necessity might stimulate the development of novel methods and technologies in energy extraction and usage that could benefit terrestrial exploitation and thus improve the management of and prolong the existence of resources on Earth. The study of human physiology in the Martian environment will provide unique insights into whole-body physiology, and in areas as bone physiology, neurovestibular and cardiovascular function. These areas are important for understanding various terrestrial disease processes (e.g. osteoporosis, muscle atrophy, cardiac impairment, and balance and co-ordination defects). Moreover, medical studies in the Martian environment associated with researches in space medicine will provide a stimulus for the development of innovative medical technology, much of which will be directly applicable to terrestrial medicine. In fact, several medical products already developed are space spin-offs including surgically implantable heart pacemaker, implantable heart defibrillator, kidney dialysis machines, CAT scans, radiation therapy for the treatment of cancer, among many others. Undoubtedly, all these space spin-offs significantly improved the human`s quality of life.

Mars 1AC – Inspiration Adv (2/3)

Resource wars cause proliferation and extinction.

Wooldridge 2009, free lance writer, once lectured at Cornell University, 2009(Frosty, “Humanity galloping toward its greatest crisis in the 21st century” http://www.australia.to/index.php?option=com\_content&view=article&id=10042:humanity-galloping-toward-its-greatest-crisis-in-the-21st-century&catid=125:frosty-wooldridge&Itemid=244

It is clear that most politicians and most citizens do not recognize that returning to “more of the same” is a recipe for promoting the first collapse of a global civilization. The required changes in energy technology, which would benefit not only the environment but also national security, public health, and the economy, would demand a World War II type mobilization -- and even that might not prevent a global climate disaster. Without transitioning away from use of fossil fuels, humanity will move further into an era of resource wars (remember, Africom has been added to the Pentagon’s structure -- and China has noticed), clearly with intent to protect US “interests” in petroleum reserves. The consequences of more resource wars, many likely triggered over water supplies stressed by climate disruption, are likely to include increased unrest in poor nations, a proliferation of weapons of mass destruction, widening inequity within and between nations, and in the worst (and not unlikely) case, a nuclear war ending civilization.

Infectious disease spread causes extinction

Steinbruner 98 – Senior Fellow at Brookings Institution [John D., “Biological weapons: A plague upon all houses,” Foreign Policy, Dec 22, LN]

It is a considerable comfort and undoubtedly a key to our survival that, so far, the main lines of defense against this threat have not depended on explicit policies or organized efforts. In the long course of evolution, the human body has developed physical barriers and a biochemical immune system whose sophistication and effectiveness exceed anything we could design or as yet even fully understand. But evolution is a sword that cuts both ways: New diseases emerge, while old diseases mutate and adapt. Throughout history, there have been epidemics during which human immunity has broken down on an epic scale. An infectious agent believed to have been the plague bacterium killed an estimated 20 million people over a four-year period in the fourteenth century, including nearly one-quarter of Western Europe's population at the time. Since its recognized appearance in 1981, some 20 variations of the HIVvirus have infected an estimated 29.4 million worldwide, with 1.5 million people currently dying of aids each year. Malaria, tuberculosis, and cholera-once thought to be under control-are now making a comeback. As we enter the twenty-first century, changing conditions have enhanced the potential for widespread contagion. The rapid growth rate of the total world population, the unprecedented freedom of movement across international borders, and scientific advances that expand the capability for the deliberate manipulation of pathogens are all cause for worry that the problem might be greater in the future than it has ever been in the past. The threat of infectious pathogens is not just an issue of public health, but a fundamental security problem for the species as a whole.

Mars 1AC – Inspiration Adv (3/3)

The second scenario is long-term effects.

The plan inspires a generation of American children to take up scientific education – that solves the economy and a laundry list of impacts.

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

Reason # 2: For the Challenge. Nations, like people, thrive on challenge and decay without it. The space program itself needs challenge. Consider: Between 1961 and 1973, under the impetus of the Moon race, NASA produced a rate of technological innovation several orders of magnitude greater than that it has shown since, for an average budget in real dollars virtually the same as that today ($19 billion in 2010 dollars). Why? Because it had a goal that made its reach exceed its grasp. It is not necessary to develop anything new if you are not doing anything new. Far from being a waste of money, forcing NASA to take on the challenge of Mars is the key to giving the nation a real technological return for its space dollar. A humans-to-Mars program would also be an challenge to adventure to every child in the country: "Learn your science and you can become part of pioneering a new world." There will be over 100 million kids in our nation's schools over the next ten years. If a Mars program were to inspire just an extra 1% of them to scientific educations, the net result would be 1 million more scientists, engineers, inventors, medical researchers and doctors, making innovations that create new industries, finding new medical cures, strengthening national defense, and increasing national income to an extent that dwarfs the expenditures of the Mars program.

US economic collapse would lead to resource wars, nuclear wars, and extinction.

Newsflavor2009(Newsflavor is a network of journalists that cover current events, political coverage, world news, and opinions, April 9, “Will an Economic Collapse Kill You?” <http://newsflavor.com/opinions/will-an-economic-collapse-kill-you/>)

It may or may not sound likely to you, but the economy is on the brink of collapse. The stock market is riding a sled down a steep hill. The United States government is spending money faster than it can print it. opinRight now the government is passing bills and proposals that will give trillions of dollars to failing companies and bankrupt manufacturers. They believe that by giving these companies resources to invest and expand, the economy will expand. The problem with this plan is that the same companies that are receiving billions of dollars in aid aren’t prepared to handle this money better than they used capitol in the past. Chances are these companies still have the same investors and management that they did pre-bailout, so who’s to say that they won’t make the same mistakes they’ve made in the past? The most likely thing to happen is that these companies are going to spend this money the same way they have in the past and that these companies are going to go bankrupt, again. These companies are the lynchpin of the economy, such as major insurance providers, banks, investment firms, manufacturers, etc. If these companies or firms were to collapse, the economy would be falling down the same pit as these companies. Not just the United States economy, because the U.S. is a major trade partner in this world, and most other countries are dependent on the United States one way or another, a United States collapse would cause a domino effect on the world’s economy. If the United States economy failed, for example, we could see Iraq, Iran, and Russia fall with them, because all of their economies are reliant off the selling of oil. Then the nations who are reliant on their economies would fail, etc. Now it’s time to look at the consequences of a failing world economy. With five official nations having nuclear weapons, and four more likely to have them there could be major consequences of another world war. The first thing that will happen after an economic collapse will be war over resources. The United States currency will become useless and will have no way of securing reserves. The United States has little to no capacity to produce oil, it is totally dependent on foreign oil. If the United States stopped getting foreign oil, the government would go to no ends to secure more, if there were a war with any other major power over oil, like Russia or China, these wars would most likely involve nuclear weapons. Once one nation launches a nuclear weapon, there would of course be retaliation, and with five or more countries with nuclear weapons there would most likely be a world nuclear war. The risk is so high that acting to save the economy is the most important issue facing us in the 21st century.

Mars 1AC – Solvency (1/2)

Observation Three is Solvency –

Modern day technology will get us there – it’s just a matter of who gets the credit

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

6. Conclusion In conclusion, the point needs to be made again. We are ready to go to Mars. Despite whatever issues that remain, the fundamental fact is that we are much better prepared today to send humans to Mars than we were to send people to the Moon in 1961, when John F. Kennedy initiated the Apollo program. Exploring Mars requires no miraculous new technologies, no orbiting spaceports, and no gigantic interplanetary space cruisers(Zubrin 1997). We can establish our first outpost on Mars within a decade. We and not some future generation can have the eternal honor of being the first pioneers of this new world for humanity. All that's needed is present-day technology, some 19th century industrial chemistry, some political vision, and a little bit of moxie.

Additionally, Mars is the best place to colonize

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

Reason # 3: For the Future: Mars is not just a scientific curiosity, it is a world with a surface area equal to all the continents of Earth combined, possessing all the elements that are needed to support not only life, but technological civilization. As hostile as it may seem, the only thing standing between Mars and habitability is the need to develop a certain amount of Red Planet know-how. This can and will be done by those who go there first to explore. Mars is the New World. Someday millions of people will live there. What language will they speak? What values and traditions will they cherish, to spread from there as humanity continues to move out into the solar system and beyond? When they look back on our time, will any of our other actions compare in value to what we do today to bring their society into being? Today, we have the opportunity to be the founders, the parents and shapers of a new and dynamic branch of the human family, and by so doing, put our stamp upon the future. It is a privilege not to be disdained lightly.

Mars 1AC – Solvency (2/2)

The timeframe is quick – using modern techonology and a “travel light” (that’s travel light, not light travel) approach, human missions to Mars would generate quick returns.

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

Some have said that a human mission to Mars is a venture for the far future, a task for “the next generation.” Such a point of view has no basis in fact (Zubrin 1997). On the contrary, the United States has in hand, today, all the technologies required for undertaking an aggressive, continuing program of human Mars exploration, with the first piloted mission reaching the Red Planet Mars within a decade. We do not need to build giant spaceships embodying futuristic technologies in order to go to Mars. We can reach the Red Planet with relatively small spacecraft launched directly to Mars by boosters embodying the same technology that carried astronauts to the Moon more than a quarter-century ago. The key to success comes from following a travel light and live off the land strategy that has well-served explorers over the centuries humanity has wandered and searched the globe. A plan that approaches human missions to the Red Planet in this way is known as the “Mars Direct” approach. Here’s how it would work. 2. The Mission At an early launch opportunity, for example 2018, a single heavy lift booster with a capability equal to that of the Saturn V used during the Apollo program is launched off Cape Canaveral and uses its upper stage to throw a 40 tonne unmanned payload onto a trajectory to Mars. Arriving at Mars 8 months later, it uses friction between its aeroshield and Mars' atmosphere to brake itself into orbit around Mars, and then lands with the help of a parachute (Zubrin 1997). This payload is the Earth Return Vehicle (ERV), and it flies out to Mars with its two methane/oxygen driven rocket propulsion stages unfueled. It also has with it 6 tonnes of liquid hydrogen cargo, a 100 kilowatt nuclear reactor mounted in the back of a methane/oxygen driven light truck, a small set of compressors and automated chemical processing unit, and a few small scientific rovers. As soon as landing is accomplished, the truck is telerobotically driven a few hundred meters away from the site, and the reactor is deployed to provide power to the compressors and chemical processing unit. The hydrogen brought from Earth can be quickly reacted with the Martian atmosphere, which is 95% carbon dioxide gas (CO2), to produce methane and water, and this eliminates the need for long term storage of cryogenic hydrogen on the planet's surface. The methane so produced is liquefied and stored, while the water is electrolyzed to produce oxygen, which is stored, and hydrogen, which is recycled through the methanator. Ultimately these two reactions (methanation and water electrolysis) produce 24 tonnes of methane and 48 tonnes of oxygen. Since this is not enough oxygen to burn the methane at its optimal mixture ratio, an additional 36 tonnes of oxygen is produced via direct dissociation of Martian CO2. The entire process takes 10 months, at the conclusion of which a total of 108 tonnes of methane/oxygen bipropellant will have been generated. This represents a leverage of 18:1 of Martian propellant produced compared to the hydrogen brought from Earth needed to create it. Ninety-six tonnes of the bipropellant will be used to fuel the ERV, while 12 tonnes are available to support the use of high powered chemically fueled long range ground vehicles. Large additional stockpiles of oxygen can also be produced, both for breathing and for turning into water by combination with hydrogen brought from Earth. Since water is 89% oxygen (by weight), and since the larger part of most foodstuffs is water, this greatly reduces the amount of life support consumables that need to be hauled from Earth. The propellant production having been successfully completed, in 2020 two more boosters lift off the Cape and throw their 40 tonne payloads towards Mars. One of the payloads is an unmanned fuel-factory/ERV just like the one launched in 2018, the other is a habitation module containing a crew of 4, a mixture of whole food and dehydrated provisions sufficient for 3 years, and a pressurized methane/oxygen driven ground rover. On the way out to Mars, artificial gravity can be provided to the crew by extending a tether between the habitat and the burnt out booster upper stage, and spinning the assembly. Upon arrival, the manned craft drops the tether, aero-brakes, and then lands at the 2018 landing site where a fully fueled ERV and fully characterized and beaconed landing site await it. With the help of such navigational aids, the crew should be able to land right on the spot; but if the landing is off course by tens or even hundreds of kilometers, the crew can still achieve the surface rendezvous by driving over in their rover; if they are off by thousands of kilometers, the second ERV provides a backup. However assuming the landing and rendezvous at site number 1 is achieved as planned, the second ERV will land several hundred kilometers away to start making propellant for the 2020 mission, which in turn will fly out with an additional ERV to open up Mars landing site number 3. Thus every other year 2 heavy lift boosters are launched, one to land a crew, and the other to prepare a site for the next mission, for an average launch rate of just 1 booster per year to pursue a continuing program of Mars exploration. This is only about 15% of the rate that the U.S. currently launches Space Shuttles, and is clearly affordable. In effect, this dogsled approach removes the manned Mars mission from the realm of mega-fantasy and reduces it to practice as a task of comparable difficulty to that faced in launching the Apollo missions to the Moon (Zubrin 1997). The crew will stay on the surface for 1.5 years, taking advantage of the mobility afforded by the high powered chemically driven ground vehicles to accomplish a great deal of surface exploration. With an 12 tonne surface fuel stockpile, they have the capability for over 24,000 kilometers worth of traverse before they leave, giving them the kind of mobility necessary to conduct a serious search for evidence of past or present life on Mars - an investigation key to revealing whether life is a phenomenon unique to Earth or general throughout the universe. Since no-one has been left in orbit, the entire crew will have available to them the natural gravity and protection against cosmic rays and solar radiation afforded by the Martian environment, and thus there will not be the strong driver for a quick return to Earth that plagues conventional Mars mission plans based upon orbiting mother-ships with small landing parties. At the conclusion of their stay, the crew returns to Earth in a direct flight from the Martian surface in the ERV. As the series of missions progresses, a string of small bases is left behind on the Martian surface, opening up broad stretches of territory to human cognizance.

Mars 1AC – Impact Framing (1/2)

Observation Four is Impact Framing

The plan puts our position in the universe in a brand new perspective. This fosters a more peaceful and caring approach that solves every impact they read.

Mitchell and Staretz 2010 Edgar D. Mitchell, Sc.D.1, Robert Staretz, M.S., October-November, 2010, Journal of Cosmology, <http://journalofcosmology.com/Mars104.html>. Mitchel is the Apollo 14 Lunar module pilot. Sixth person to walk on the Moon. “Our Destiny – A Space Faring Civilization?” DOA: 6/21/11

States of consciousness have been studied for centuries by Tibetan Buddhist monks. The most profound state they refer to is known as Nirvikalpa Samadhi. It is a level of the highest spiritual attainment and evolution, the state of deep undifferentiated awareness in which there is only the Self within a transcendent observing entity. There are no thoughts or objects in mind. It is a state beyond time and space. The Self expands and merges into the entire field of mind so that pure awareness is all that exists**.** After attaining this state one has complete understanding of cosmic wisdom and one feels that he is in complete union with the Creative Source of all that is. At this point all ordinary concerns and everything else become subordinate to this union and lose all meaning. In this state unconditional love is the organizing principle of the universe. We do not mean to imply that all highly advanced extraterrestrial civilizations have reached such a state. Perhaps the oldest and most advanced have. It is likely that if their entire civilization and all individuals comprising it had reached it, they likely would no longer be interested with the Earthly concerns of humans on this little remote planet in the backwaters of the Milky Way Galaxy. It is more likely that for evolved self reflective beings throughout the cosmos, there is a spectrum of consciousness that reaches from two extremes. On the left end of this spectrum a state of consciousness exists with concern only for promoting the self, accompanied with outright disdain or malevolence towards other living beings. On the opposite end of such a spectrum perhaps is a state of consciousness similar to Nirvikalpa Samadhi. On such a cosmic scale most humans would be placed to left of center busily pursuing their own self interests where their use of technology has far outpaced the values and ethics necessary to use them wisely. Our expectation is that extra-terrestrial intelligences are shifted by varying degrees beyond human civilization more to the right end of the spectrum. Hopefully as humanity takes its place among space faring civilizations we will evolve more to the right as well. If human history teaches us anything, failure to do so is no longer a viable option.

Mars 1AC – Impact Framing (2/2)

If we win that the plan has even the slightest risk of extending human life past the destruction of Earth, this outweighs the timeframe differential of their disadvantages.

Bostrom 2003, [www.nickbostrom.com/astronomical/waste.html](http://www.nickbostrom.com/astronomical/waste.html" \t "_blank)

However, the true lesson is a different one. If what we are concerned with is (something like) maximizing the expected number of worthwhile lives that we will create, then in addition to the opportunity cost of delayed colonization, we have to take into account the risk of failure to colonize at all. We might fall victim to an existential risk, one where an adverse outcome would either annihilate Earth-originating intelligent life or permanently and drastically curtail its potential.[[8]](http://www.nickbostrom.com/astronomical/waste.html" \l "_edn8" \o ") Because the lifespan of galaxies is measured in billions of years, whereas the time-scale of any delays that we could realistically affect would rather be measured in years or decades, the consideration of risk trumps the consideration of opportunity cost. For example, a single percentage point of reduction of existential risks would be worth (from a utilitarian expected utility point-of-view) a delay of over 10 million years. Therefore, if our actions have even the slightest effect on the probability of eventual colonization, this will outweigh their effect on when colonization takes place. For standard utilitarians, priority number one, two, three and four should consequently be to reduce existential risk. The utilitarian imperative “Maximize expected aggregate utility!” can be simplified to the maxim “Minimize existential risk!”.

2AC – Cooperation DA

Non-Unique – we cancelled the Constellation program without any cooperation.

Newton & Griffin 2011– Center for System Studies, University of Alabama - Huntsville [Elizabeth K. Newton\*, Michael D. Griffin, “United States space policy and international partnership,” Space Policy 27 (2011) 7-9//edlee]

President Obama’s 2010 policy is notable for the shift over the 2006 version, which most agree to be more a stylistic change of tone, rather than one of substance. The messages conveying the need for multilateral action are likely to be welcome to external audiences’ ears and suggest a more consultative approach. That said, the cancellation of the Constellation program was done without prior notice or consultation with international partners, and much of the debate on the subject has centered on the domestic repercussions of the decision, not the impact on the partners. There is evidently a mismatch between intent and such unilateralist actions.

Turn – US tech leadership creates international space coalitions

Stone2011- Space policy analyst and strategist [Christopher Stone, “American leadership in space: leadership through capability,” The Space Review, Monday, March 14, 2011, pg. <http://www.thespacereview.com/article/1797/1>//edlee]

When it comes to space exploration and development, including national security space and commercial, I would disagree somewhat with Mr. Friedman’s assertion that space is “often” overlooked in “foreign relations and geopolitical strategies”. My contention is that while space is indeed overlooked in national grand geopolitical strategies by many in national leadership, space is used as a tool for foreign policy and relations more often than not. In fact, I will say that the US space program has become less of an effort for the advancement of US space power and exploration, and is used more as a foreign policy tool to “shape” the strategic environment to what President Obama referred to in his National Security Strategy as “The World We Seek”. Using space to shape the strategic environment is not a bad thing in and of itself. What concerns me with this form of “shaping” is that we appear to have changed the definition of American leadership as a nation away from the traditional sense of the word. Some seem to want to base our future national foundations in space using the important international collaboration piece as the starting point. Traditional national leadership would start by advancing United States’ space power capabilities and strategies first, then proceed toward shaping the international environment through allied cooperation efforts. The United States’ goal should be leadership through spacefaring capabilities, in all sectors. Achieving and maintaining such leadership through capability will allow for increased space security and opportunities for all and for America to lead the international space community by both technological and political example. The world has recognized America as the leaders in space because it demonstrated technological advancement by the Apollo lunar landings, our deep space exploration probes to the outer planets, and deploying national security space missions. We did not become the recognized leaders in astronautics and space technology because we decided to fund billions into research programs with no firm budgetary commitment or attainable goals. We did it because we made a national level decision to do each of them, stuck with it, and achieved exceptional things in manned and unmanned spaceflight. We have allowed ourselves to drift from this traditional strategic definition of leadership in space exploration, rapidly becoming participants in spaceflight rather than the leader of the global space community. One example is shutting down the space shuttle program without a viable domestic spacecraft chosen and funded to commence operations upon retirement of the fleet. We are paying millions to rely on Russia to ferry our astronauts to an International Space Station that US taxpayers paid the lion’s share of the cost of construction. Why would we, as United States citizens and space advocates, settle for this? The current debate on commercial crew and cargo as the stopgap between shuttle and whatever comes next could and hopefully will provide some new and exciting solutions to this particular issue. However, we need to made a decision sooner rather than later. Finally, one other issue that concerns me is the view of the world “hegemony” or “superiority” as dirty words. Some seem to view these words used in policy statements or speeches as a direct threat. In my view, each nation (should they desire) should have freedom of access to space for the purpose of advancing their “security, prestige and wealth” through exploration like we do. However, to maintain leadership in the space environment, space superiority is a worthy and necessary byproduct of the traditional leadership model. If your nation is the leader in space, it would pursue and maintain superiority in their mission sets and capabilities. In my opinion, space superiority does not imply a wall of orbital weapons preventing other nations from access to space, nor does it preclude international cooperation among friendly nations. Rather, it indicates a desire as a country to achieve its goals for national security, prestige, and economic prosperity for its people, and to be known as the best in the world with regards to space technology and astronautics. I can assure you that many other nations with aggressive space programs, like ours traditionally has been, desire the same prestige of being the best at some, if not all, parts of the space pie. Space has been characterized recently as “congested, contested, and competitive”; the quest for excellence is just one part of international space competition that, in my view, is a good and healthy thing. As other nations pursue excellence in space, we should take our responsibilities seriously, both from a national capability standpoint, and as country who desires expanded international engagement in space. If America wants to retain its true leadership in space, it must approach its space programs as the advancement of its national “security, prestige and wealth” by maintaining its edge in spaceflight capabilities and use those demonstrated talents to advance international prestige and influence in the space community. These energies and influence can be channeled to create the international space coalitions of the future that many desire and benefit mankind as well as America. Leadership will require sound, long-range exploration strategies with national and international political will behind it. American leadership in space is not a choice. It is a requirement if we are to truly lead the world into space with programs and objectives “worthy of a great nation”.

2AC – Robots CP

1. Perm do plan using both humans and robots.
2. Perm solves best – while robots are effective, they lack key characteristics that make humans more suited for the job.

Schulze-Makuch and Davies 2010 **Dirk Schulze-Makuch, Ph.D.1, and Paul Davies, Ph.D.2,**  1School of Earth and Environmental Sciences, Washington State University  2Beyond Center, Arizona State University, October-November, 2010, To Boldly Go: A One Way Mission to Mars, <http://journalofcosmology.com/Mars108.html> DAO: 7/5/11 MG

Why Humans? Humans have unique capabilities for performing scientific measurements, observations and sample collecting. Human attributes to exploration include: intelligence, adaptability, agility, dexterity, cognition, patience, problem solving in real-time, in situ analyses - more science in less time! Humans are unique scientific explorers. Humans could obtain previously unobtainable scientific measurements on the surface of Mars. Humans possess the abilities to adapt to new and unexpected situations in new and strange environments, they can make real-time decisions, have strong recognition abilities and are intelligent. Humans could perform detailed and precise measurements of the surface, subsurface and atmosphere while on the surface of Mars with state-of–the-art scientific equipment and instrumentation brought from Earth. The increased laboratory ability on Mars that humans offer, would allow for dramatically more scientific return within the established sample return limits. The HEM-SAG envisions that the scientific exploration of Mars by humans would be performed as a synergistic partnership between humans and robotic probes, controlled by the human explorers on the surface of Mars. Robotic probes could explore terrains and features not suitable or too risky for human exploration. Under human control, robotic probes could traverse great distances from the human habitat covering distances/terrain too risky for human exploration and return rock and dust samples to the habitat from great distances. An important element of the HEM-SAG study has been to identity the unique capabilities that humans would bring to the process of exploring Mars. As a result, a common set of human traits emerged that would apply to exploration relating to the MEPAG science disciplines which include Geology, Geophysics, Atmosphere/Climate, and Biology/Life, These characteristics include: speed and efficiency to optimize field work; agility and dexterity to go places difficult for robotic access and to exceed currently limited degrees-of-freedom robotic manipulation capabilities; and most importantly the innate intelligence, ingenuity, and adaptability to evaluate real-time and improvise to overcome surprises while ensuring that the correct sampling strategy is in place to acquire the appropriate sample set.

Only human involvement inspires the world

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 7/05/11 MG

Perhaps the best historical analogue for Mars is not the voyage of Christopher Columbus or the journey of Lewis and Clark but the polar expedition of Robert Peary. In 1908, Peary made his final dash for the North Pole. Unlike earlier explorers who has tried to unite the activities of science and discovery together, Peary abandoned this strategy, foregoing science in the pursuit of being "first at the Pole." It wasn’t that Peary, trained as an engineer and a member of the AAAS, scorned science, rather he understood something that still holds true today: the interests of science are often at cross-purposes to the pursuit of geographical discovery (Robinson 2006). In Peary’s case, this meant that he had to look outside of the Federal government for support, raising money from private donors and members of the public. These groups accepted the symbolic, visionary power of the "Attainment of the Pole" despite the fact that Peary’s expedition planned to do little else at 90˚N that was scientific or practical. It was not a plan without risks. Science carried credibility – then as now – and it helped give status to earlier expeditions in the 1800s. Yet Peary sailed north nevertheless. He returned with little to show for his exploits but a series of photographs of the polar world. The photos almost always shows Peary or a member of his party in the foreground of the polar landscape. He knew that photos needed a human figure to serve as the viewer’s proxy. The same holds true today. The value of human explorers lies in who they are rather than what they can do: to watch an astronaut walk through the red dust of Mars is imagine ourselves there.

2AC – Spending DA

The plan only costs half a percent of the military budget and is comparatively more important than your DA.

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

3. We Can Afford It Such is the basic Mars Direct plan. In 1990, when it was first put forward, it was viewed as too radical for NASA to consider seriously, but over the next several years with the encouragement of then NASA Associate Administrator for Exploration Mike Griffin, the group at Johnson Space Center in charge of designing human Mars missions decided to take a good hard look at it. They produced a detailed study of a Design Reference Mission based on the Mars Direct plan but scaled up about a factor of 2 in expedition size compared to the original concept. They then produced a cost estimate for what a Mars exploration program based upon this expanded Mars Direct would cost. Their result; $50 billion, with the estimate produced by the same costing group that assigned a $400 billion price tag to the traditional cumbersome approach to human Mars exploration embodied in NASA's 1989 "90 Day Report." I believe that with further discipline applied to the mission design, the program cost could be brought down to the $30 to $40 billion range. Spent over ten years, this would imply an annual expenditure on the order of 20% of NASA’s budget, or about half a percent of the US military budget. It is a small price to pay for a new world.

2AC – Plan Popular

Link turn – the plan is the only way to garner support for space

Thompson2011 (Loren, Chief Financial Officer – Lexington Institute, “Human Spaceflight”, April, <http://www.lexingtoninstitute.org/library/resources/documents/Defense/HumanSpaceflight-Mars.pdf>)

The National Aeronautics and Space Administration’s human spaceflight program is one of the greatest scientific achievements in history. However, the program has been slowly dying since the Challenger Space Shuttle disaster 25 years ago. Faltering political support, failed technologies and competing claims on an under-funded federal budget have made it difficult to sustain a coherent program from administration to administration. The Obama Administration has offered a bold plan for nudging human spaceflight out of its decaying orbit, but the plan received only mixed support in Congress and looks unlikely to sustain political momentum over the long term. Although NASA consumes less than one-percent of the federal budget, it does not connect well with the current economic or social agendas of either major political party. The broad support for the human spaceflight program early in its history was traceable largely to the ideological rivalry between America and Russia that produced the Moon race. Today, no such external driver exists to sustain support of human spaceflight across the political spectrum. The program therefore must generate some intrinsic rationale -- some combination of high purpose and tangible benefit -- to secure funding. Recent efforts at generating a compelling rationale, such as the “flexible path” and “capabilitiesdriven” approaches currently favored by the space agency, are inadequate. They do not resonate with the political culture. In the current fiscal and cultural environment, there is only one goal for the human spaceflight program that has a chance of capturing the popular imagination: Mars. The Red Planet is by far the most Earth-like object in the known universe beyond the Earth itself, with water, seasons, atmosphere and other features that potentially make it habitable one day by humans. In addition, its geological characteristics make it a potential treasure trove of insights into the nature of the solar system -- insights directly relevant to what the future may hold for our own world. And Mars has one other key attraction: it is reachable. Unlike the hundreds of planets now being discovered orbiting distant stars, astronauts could actually reach Mars within the lifetime of a person living today, perhaps as soon as 20 years from now. This report makes the case for reorienting NASA’s human spaceflight program to focus on an early manned mission to Mars. It begins by briefly reviewing the history of the human spaceflight program and explaining why current visions of the program’s future are unlikely to attract sustained political support. It then describes the appeal of Mars as an ultimate destination, and the range of tangible benefits that human missions there could produce. It concludes by describing the budgetary resources and scientific tools needed to carry out such missions. The basic thesis of the report is that human missions to Mars can be accomplished within NASA’s currently projected budgets; that proposed missions to other destinations such as near-Earth asteroids should be reconfigured as stepping-stones to the ultimate goal of the Red Planet; and that if Mars does not become the official goal of the human spaceflight program, then the program will effectively be dead by the end of the current decade.

2AC – GOTR Ext

Have to get off the rock to avoid extinction

Houston Chronicle 10/19/2002 (a newspaper in Houston, “To Infinity and Beyond… Colonization a Real Possibility?”)

With Apollo astronaut John Young leading the charge, top aerospace experts warned Friday that humanity's survival may depend on how boldly the world's space agencies venture into the final frontier. Only a spacefaring culture with the skills to travel among and settle planets can be assured of escaping a collision between Earth and a large asteroid or devastation from the eruption of a super volcano, they told the World Space Congress. "Space exploration is the key to the future of the human race," said Young, who strolled on the moon more than 30 years ago and now serves as the associate director of NASA's Johnson Space Center. "We should be running scared to go out into the solar system. We should be running fast." Scientists believe that an asteroid wiped out the dinosaurs more than 60 million years ago, and are gathering evidence of previously large collisions. "The civilization of Earth does not have quite as much protection as we would like to believe," said Leonid Gorshkov, an exploration strategist with RSC Energia, one of Russia's largest aerospace companies. "We should not place all of our eggs in one basket."

**Humans on earth are doomed, but Mars presents the best possibility for colonization**

Schulze & Davies ‘10 Dirk Schulze-Makuch, Ph.D., and Paul Davies, Ph.D., 1School of Earth and Environmental Sciences, Washington State University; Beyond Center, Arizona State University Journal of Cosmology, 2010, Vol 12, 3619-3626. ; “**To Boldly Go: A One-Way Human Mission to Mars”;** October-November 2010; http://journalofcosmology.com/Mars108.html [Schaaf]

There are several reasons that motivate the establishment of a permanent Mars colony. We are a vulnerable species living in a part of the galaxy where cosmic events such as major asteroid and comet impacts and supernova explosions pose a significant threat to life on Earth, especially to human life. There are also more immediate threats to our culture, if not our survival as a species. These include global pandemics, nuclear or biological warfare, runaway global warming, sudden ecological collapse and supervolcanoes (Rees 2004). Thus, the colonization of other worlds is a must if the human species is to survive for the long term. The first potential colonization targets would be asteroids, the Moon and Mars. The Moon is the closest object and does provide some shelter (e.g., lava tube caves), but in all other respects falls short compared to the variety of resources available on Mars. The latter is true for asteroids as well. Mars is by far the most promising for sustained colonization and development, because it is similar in many respects to Earth and, crucially, possesses a moderate surface gravity, an atmosphere, abundant water and carbon dioxide, together with a range of essential minerals. Mars is our second closest planetary neighbor

2AC – Global Warming Ext.

Warming is real, anthropogenic, and causes extinction.

Deibel 2007,Professor of IR @ National War College, **07** (Terry L. “Foreign Affairs Strategy: Logic for American Statecraft”, Conclusion: American Foreign Affairs Strategy Today)

Finally, there is one major existential threat to American security (as well as prosperity) of a nonviolent nature, which, though far in the future, demands urgent action. It is the threat of global warming to the stability of the climate upon which all earthly life depends. Scientists worldwide have been observing the gathering of this threat for three decades now, and what was once a mere possibility has passed through probability to near certainty. Indeed not one of more than 900 articles on climate change published in refereed scientific journals from 1993 to 2003 doubted that anthropogenic warming is occurring. “In legitimate scientific circles,” writes Elizabeth Kolbert, “it is virtually impossible to find evidence of disagreement over the fundamentals of global warming.” Evidence from a vast international scientific monitoring effort accumulates almost weekly, as this sample of newspaper reports shows: an international panel predicts “brutal droughts, floods and violent storms across the planet over the next century”; climate change could “literally alter ocean currents, wipe away huge portions of Alpine Snowcaps and aid the spread of cholera and malaria”; “glaciers in the Antarctic and in Greenland are melting much faster than expected, and…worldwide, plants are blooming several days earlier than a decade ago”; “rising sea temperatures have been accompanied by a significant global increase in the most destructive hurricanes”; “NASA scientists have concluded from direct temperature measurements that 2005 was the hottest year on record, with 1998 a close second”; “Earth’s warming climate is estimated to contribute to more than 150,000 deaths and 5 million illnesses each year” as disease spreads; “widespread bleaching from Texas to Trinidad…killed broad swaths of corals” due to a 2-degree rise in sea temperatures. “The world is slowly disintegrating,” concluded Inuit hunter Noah Metuq, who lives 30 miles from the Arctic Circle. “They call it climate change…but we just call it breaking up.” From the founding of the first cities some 6,000 years ago until the beginning of the industrial revolution, carbon dioxide levels in the atmosphere remained relatively constant at about 280 parts per million (ppm). At present they are accelerating toward 400 ppm, and by 2050 they will reach 500 ppm, about double pre-industrial levels. Unfortunately, atmospheric CO2 lasts about a century, so there is no way immediately to reduce levels, only to slow their increase, we are thus in for significant global warming; the only debate is how much and how serous the effects will be. As the newspaper stories quoted above show, we are already experiencing the effects of 1-2 degree warming in more violent storms, spread of disease, mass die offs of plants and animals, species extinction, and threatened inundation of low-lying countries like the Pacific nation of Kiribati and the Netherlands at a warming of 5 degrees or less the Greenland and West Antarctic ice sheets could disintegrate, leading to a sea level of rise of 20 feet that would cover North Carolina’s outer banks, swamp the southern third of Florida, and inundate Manhattan up to the middle of Greenwich Village. Another catastrophic effect would be the collapse of the Atlantic thermohaline circulation that keeps the winter weather in Europe far warmer than its latitude would otherwise allow. Economist William Cline once estimated the damage to the United States alone from moderate levels of warming at 1-6 percent of GDP annually; severe warming could cost 13-26 percent of GDP. But the most frightening scenario is runaway greenhouse warming, based on positive feedback from the buildup of water vapor in the atmosphere that is both caused by and causes hotter surface temperatures. Past ice age transitions, associated with only 5-10 degree changes in average global temperatures, took place in just decades, even though no one was then pouring ever-increasing amounts of carbon into the atmosphere. Faced with this specter, the best one can conclude is that “humankind’s continuing enhancement of the natural greenhouse effect is akin to playing Russian roulette with the earth’s climate and humanity’s life support system. At worst, says physics professor Marty Hoffert of New York University, “we’re just going to burn everything up; we’re going to heat the atmosphere to the temperature it was in the Cretaceous when there were crocodiles at the poles, and then everything will collapse.” During the Cold War, astronomer Carl Sagan popularized a theory of nuclear winter to describe how a thermonuclear war between the Untied States and the Soviet Union would not only destroy both countries but possibly end life on this planet. Global warming is the post-Cold War era’s equivalent of nuclear winter at least as serious and considerably better supported scientifically. Over the long run it puts dangers form terrorism and traditional military challenges to shame. It is a threat not only to the security and prosperity to the United States, but potentially to the continued existence of life on this planet.

2AC – Mars is Awesome

Everything’s set – Conditions are perfect on Mars for colonization

Zubrin 2000, Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology**,** [“The Economic Viability of Mar Colonization,” http://www.aleph.se/Trans/Tech/Space/mars.html]

Among extraterrestrial bodies in our solar system, Mars is unique in that it possesses all the raw materials required to support not only life, but a new branch of human civilization. This uniqueness is illustrated most clearly if we contrast Mars with the Earth's Moon, the most frequently cited alternative location for extraterrestrial human colonization. In contrast to the Moon, Mars is rich in carbon, nitrogen, hydrogen and oxygen, all in biologically readily accessible forms such as CO2 gas, nitrogen gas, and water ice and permafrost. Carbon, nitrogen, and hydrogen are only present on the Moon in parts per million quantities, much like gold in sea water. Oxygen is abundant on the Moon, but only in tightly bound oxides such as SiO2, Fe2O3, MgO, and Al2O3, which require very high energy processes to reduce. Current knowledge indicates that if Mars were smooth and all it's ice and permafrost melted into liquid water, the entire planet would be covered with an ocean over 100 meters deep. This contrasts strongly with the Moon, which is so dry that if concrete were found there, Lunar colonists would mine it to get the water out. Thus, if plants were grown in greenhouses on the Moon ( a very difficult proposition, as we shall see) most of their biomass material would have to be imported. The Moon is also deficient in about half the metals (for example copper) of interest to industrial society, as well as many other elements of interest such as sulfur and phosphorus. Mars has every required element in abundance. Moreover, on Mars, as on Earth, hydrologic and volcanic processes have occurred, which is likely to have concentrated various elements into local concentrations of high-grade mineral ore. Indeed, the geologic history of Mars has been compared with that of Africa7, with very optimistic inferences as to its mineral wealth implied as a corollary. In contrast, the Moon has had virtually no history of water or volcanic action, with the result that it is basically composed of trash rocks with very little differentiation into ores that represent useful concentrations of anything interesting. But the biggest problem with the Moon, as with all other airless planetary bodies and proposed artificial free-space colonies (such as those proposed by Gerard O'Neill8) is that sunlight is not available in a form useful for growing crops. This is an extremely important point and it is not well understood. Plants require an enormous amount of energy for their growth, and it can only come from sunlight. For example a single square kilometer of cropland on Earth is illuminated with about 1000 MW of sunlight at noon; a power load equal to an American city of 1 million people. Put another way, the amount of power required to generate the sunlight falling on the tiny country of El Salvador exceeds the combined capacity of every power plant on Earth. Plants can stand a drop of perhaps a factor of 5 in their light intake compared to terrestrial norms and still grow, but the fact remains; the energetics of plant growth make it inconceivable to raise crops on any kind of meaningful scale with artificially generated light. That said, the problem with using the natural sunlight available on the Moon or in space is that it is unshielded by any atmosphere. (The Moon has an additional problem with its 28 day light/dark cycle, which is also unacceptable to plants). Thus plants grown in a thin walled greenhouse on the surface of the Moon or an asteroid would be killed by solar flares. In order to grow plants safely in such an environment, the walls of the greenhouse would have to be made of glass 10 cm thick, a construction requirement that would make the development of significant agricultural areas prohibitively expensive. Use of reflectors and other light-channeling devices would not solve this problem, as the reflector areas would have to be enormous, essentially equal in area to the crop domains, creating preposterous engineering problems if any significant acreage is to be illuminated. Mars, on the other hand, has an atmosphere of sufficient density to protect crops grown on the surface against solar flares. On Mars, even during the base building phase, large inflatable greenhouses made of transparent plastic protected by thin hard-plastic ultra-violet and abrasion resistant geodesic domes could be readily deployed, rapidly creating large domains for crop growth. Even without the problems of solar flares and a month-long diurnal cycle, such simple greenhouses would be impractical on the Moon as they would create unbearably high temperatures. On Mars, in contrast, the strong greenhouse effect created by such domes would be precisely what is necessary to produce a temperate climate inside. Even during the base building phase, domes of this type up to 50 meters in diameter could be deployed on Mars that could contain the 5 psi atmosphere necessary to support humans. If made of high strength plastics such as Kevlar, such a dome could have a safety factor of 4 against burst and weigh only about 4 tonnes, with another 4 tonnes required for its unpressurized Plexiglas shield. In the early years of settlement, such domes could be imported pre-fabricated from Earth. Later on they could be manufactured on Mars, along with larger domes (with the mass of the pressurized dome increasing as the cube of its radius, and the mass of the unpressurized shield dome increasing as the square of the radius: 100 meter domes would mass 32 tonnes and need a 16 tonne Plexiglas shield, etc.). Networks of such 50 to 100 meter domes could rapidly be manufactured and deployed, opening up large areas of the surface to both shirtsleeve human habitation and agriculture. If agriculture only areas are desired, the domes could be made much bigger, as plants do not require more than about 1 psi atmospheric pressure. Once Mars has been partially terraformed however, with the creation of a thicker CO2 atmosphere via regolith outgassing, the habitation domes could be made virtually to any size, as they would not have to sustain a pressure differential between their interior and exterior. The point, however, is that in contrast to colonists on any other known extraterrestrial body, Martian colonists will be able to live on the surface, not in tunnels, and move about freely and grow crops in the light of day. Mars is a place where humans can live and multiply to large numbers, supporting themselves with products of every description made out of indigenous materials. Mars is thus a place where an actual civilization, not just a mining or scientific outpost, can be developed. And significantly for interplanetary commerce, Mars and Earth are the only two locations in the solar system where humans will be able to grow crops for export.

2AC – Solvency Ext

Mars is perfect for colonization

**David 2005** writer for space.com **05** (Leonard, Space.com, “Space Colonization: The Quiet Revolution”, February 23 2005, http://www.space.com/813-space-colonization-quiet-revolution.html) [KEZIOS]

Why put Mars in the colonization crosshairs? "Mars is a planet that has many unusual and spectacular features that will draw people to it," McCullough told the STAIF gathering. "Being a planet rather than a moon, it has undergone many of the geological processes which have caused the formation of minerals on Earth," he said. That being the case, Mars is a user-friendly world, rife with many industrially useful minerals for construction and manufacturing purposes. It has a suite of "ates", "ites" and "ides" of common metals with common non metals, McCullough pointed out. The red planet is also wrapped in abundant carbon dioxide which will be fairly easy to condense, he said. Water availability on Mars is another huge plus. There is abundant evidence of past water activity on Mars. It should be present in permafrost at higher latitudes on the planet. It may also be present in hydrated minerals, McCullough stated. "The availability of water on Mars in significant quantities would once again simplify our projected industrial activities. This makes extensive bases leading to colonies more likely," McCullough concluded.

Mars can be terraformed for colonization

**Zubrin and McKay 2003** Pioneer Astronautics and NASA Ames Research Center (Robert M., Christopher P., no date given, http://www.bibliotecapleyades.net/universo/terraforming/terraforming03.htm)[KEZIOS]

Many people can accept the possibility of a permanently staffed base on Mars, or even the establishment of large settlements. However the prospect of drastically changing the planet's temperature and atmosphere towards more earthlike conditions, or "terraforming" seems to most people to be either sheer fantasy or at best a technological challenge for the far distant future. But is this pessimistic point of view correct? Despite the fact that Mars today is a cold, dry, and probably lifeless planet, it has all the elements required to support life: water carbon and oxygen (as carbon dioxide), and nitrogen. The physical aspects of Mars, its gravity, rotation rate and axial tilt are close enough to those of Earth to be acceptable and it is not too far from the Sun to be made habitable. In fact computational studies utilizing climate models suggest that it could be possible to make Mars habitable again with foreseeable technology. The essence of the situation is that while Mars' CO2 atmosphere has only about 1% the pressure of the Earth's at sea level, it is believed that there are reserves of CO2 frozen in the south polar cap and adsorbed within the soil sufficient to thicken the atmosphere to the point where its pressure would be about 30% that of Earth. The way to get this gas to emerge is to heat the planet, and in fact, the warming and cooling of Mars that occurs each Martian year as the planet cycles between its nearest and furthest positions from the Sun in its slightly elliptical orbit cause the atmospheric pressure on Mars to vary by plus or minus 25% compared to its average value on a seasonal basis. We can not, of course, move Mars to a warmer orbit. However we do know another way to heat a planet, through an artificially induced greenhouse effect that traps the Sun's heat within the atmosphere. Such an atmospheric greenhouse could be created on Mars in at least three different ways. One way would be to set up factories on Mars to produce very powerful artificial greenhouse gasses such as halocarbons ("CFC's") and release them into the atmosphere. Another way would be to use orbital mirrors or other large scale power sources to warm selected areas of the planet, such as the south polar cap, to release large reservoirs of the native greenhouse gas, CO2, which may be trapped their in frozen or adsorbed form. Finally natural greenhouse gases more powerful than CO2 (but much less so than halocarbons) such as ammonia or methane could be imported to Mars in large quantities if asteroidal objects rich with such volatiles in frozen form should prove to exist in the outer solar system. Each of these methods of planetary warming would be enhanced by large amounts of CO2 from polar cap and the soil that would be released as a result of the induced temperature rise. This CO2 would add massively to the greenhouse effect being created directly, speeding and multiplying the warming process. The Mars atmosphere/regolith greenhouse effect system is thus one with a built-in positive feedback. The warmer it gets, the thicker the atmosphere becomes; and the thicker the atmosphere becomes the warmer it gets. A method of modeling this system and the results of calculations based upon it are given in the sections below.

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2AC – Solvency Ext

Mars has elements to sustain life

Hiscox 08, Julian A.: BSc, UCL; PhD, Department of Microbiology, Professor at University of Alabama at Birmingham (“Biology and the Planetary Engineering of Mars,” http://spot.colorado.edu/~marscase/cfm/articles/biorev3.html)[KEZIOS]

However, Mars does contain sufficient volatiles to enable some form of colonization and perhaps planetary engineering to render environmental conditions more clement for terrestrial life to survive and grow (Meyer and McKay, 1984, 1989; McKay et al. 1991a; Fogg, 1995c; Zubrin, 1995). Analysis of Martian soil and shergottites, nakhlites and chassignittes (SNC) meteorites (believed to have been ejected from Mars - Mustard and Sunshine, 1995 and references therein) has shown that all of the elements necessary for carbon based life on Earth are present on Mars (Dreibus and Wanke, 1987; Gooding, 1992; Banin and Mancinelli, 1995). It is evident that Mars once possessed a more clement climate and many observable surface features have been attributed to the presence of liquid water and a dense carbon dioxide atmosphere (Carr, 1986; 1987). Many planetary engineering scenarios (see Fogg, 1995c and references there in) propose that it may be possible to return Mars to an earlier such climate using planetary engineering techniques (with the proviso that such volatiles are still present). Fogg (1995c) suggests that unless impact erosion (Melosh and Vickery, 1989) "blasted" the atmosphere into space then huge quantities of volatiles are still likely to reside on the planet. Over geological history Mars may have lost more volatiles than it gained. For example, water may also have been lost by hydrodynamic escape, atmospheric spluttering and other mechanisms (refer to Carr, 1987; Jakosky, 1991; Kass and Yung, 1995). Therefore returning Mars to a past climatic state may not be possible, and clearly given the climatic history of Mars such a climate maybe geologically unstable and undesirable for the extreme long term habitability of the planet. A number of compounds and elements are absolutely required for life; liquid water, the so called CHNOPS (carbon, hydrogen, nitrogen, oxygen, phosphorous and sulfur) are the main elements which constitute amino acids (which make up proteins) and nucleotides (which make up DNA and RNA) and various minerals are also required. All of these elements/compounds are believed to be present on Mars (Banin and Mancinelli, 1995). The amount and location of these resources on Mars is briefly reviewed below.

2AC – Developing Countries Add-on

Plan boosts developing countries by increasing investment opportunities

Rampelotto 2011 (Pabulo Henrique, Department of Biology, Federal University of Santa Maria (UFSM), Brazil, “Why Send Humans to Mars? Looking Beyond Science”) <http://journalofcosmology.com/Mars151.html> DOA: 6/20/11

At the economical level, both the public and the private sector might be beneficiated with a manned mission to Mars, especially if they work in synergy. Recent studies indicate a large financial return to companies that have successfully commercialized NASA life sciences spin-off products. Thousands of spin-off products have resulted from the application of space-derived technology in fields as human resource development, environmental monitoring, natural resource management, public health, medicine and public safety, telecommunications, computers and information technology, industrial productivity and manufacturing technology and transportation. Besides, the space industry has already a significant contribution on the economy of some countries and with the advent of the human exploration of Mars, it will increase its impact on the economy of many nations. This will include positive impact on the economy of developing countries since it open new opportunities for investments.

2AC – A2: Extra-Terrestrial Disease

Your argument is both wrong and non-unique.

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

4.3. Back Contamination: Recently some people have raised the issue of possible back-contamination as a reason to shun human (or robotic sample return) missions to Mars. Such fears have no basis in science. The surface of Mars is too cold for liquid water, is exposed to near vacuum, ultra violet, and cosmic radiation, and contains an antiseptic mixture of peroxides that have eliminated any trace of organic material. It is thus as sterile an environment as one could ask for. Furthermore, pathogens are specifically adapted to their hosts. Thus, while there may be life on Mars deep underground, it is quite unlikely that these could be pathogenic to terrestrial plants or animals, as there are no similar macrofauna or macroflora to support a pathogenic life cycle in Martian subsurface groundwater. In any case, the Earth currently receives about 500 kg of Martian meteoritic ejecta per year. The trauma that this material has gone through during its ejection from Mars, interplanetary cruise, and re-entry at Earth is insufficient to have sterilized it, as has been demonstrated experimentally and in space studies on the viability of microorganisms following ejection and reentry (Burchell et al. 2004; Burchella et al. 2001; Horneck et al. 1994, 1995, 2001, Horneck et al. 1993; Mastrapaa et al. 2001; Nicholson et al. 2000). So if there is the Red Death on Mars, we’ve already got it. Those concerned with public health would do much better to address their attentions to Africa.

Non-unique and turn – we’re already culturing space bacteria – it ONLY helps us find new cures.

ABC News 2007 [“Space travel makes bacteria more deadly: study,” http://www.abc.net.au/news/stories/2007/09/25/2042694.htm]

Cheryl Nickerson is an associate professor at the Centre for Infectious Diseases and Vaccinology at Arizona State University, and lead author of the study. "We know that reports suggest that there are aspects of the astronauts' immune systems that don't function quite as well in flight as they do on the ground, and so that suggested increased risk for infectious disease events," she said. "In particular, when we start looking at these future missions ... as we continue to push the frontiers and explore our universe, we're going to be extending both our duration, in terms of our length of time, that we send humans into space, and also they're going to be much further out in space and much further away from Earth than they have been. "As we start to make those kinds of changes in space flight, there comes with that an increased risk of infectious disease." Clinical use Prof Nickerson says that deepening understanding of how the bacteria react in certain situations could also have applications in the treatment of infectious diseases on Earth. "Using this new insight that we're gaining from culturing these bacteria - under ways that they normally encounter in the body, but we haven't paid a lot of attention to before - opens up the possibility that we can identify new targets that have a real potential to be translated to a clinical application, perhaps as a new drug or therapeutic or vaccine to treat the infections, whether it's for astronauts or for space tourists, or for us here on Earth," she said. The astronaut who carried out the experiment on board Atlantis collapsed during a welcome home ceremony from the mission. NASA experts attributed that to her adjusting to gravity. And Assoc Prof Nickerson says the incident was totally unrelated to her work with the bacteria. "At no time were the crew at any risk - this experiment was properly contained in triple containment levels for their safety," she said. "Nor was anyone on the ground, or nor is anyone on the ground in any risk for these bacteria. "Everyone actually has potential to benefit because of the novelty in the ways that this bug is now showing us that it's causing disease."

2AC – A2: Dust Storms

Once we land, zero harm comes from dust storms

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

4.5. Dust Storms: Mars has intermittent local, and occasionally global dust storms with wind speeds up to 100 km/hour. Attempting to land through such an event would be a bad idea, and two Soviet probes committed to such a maelstrom by their uncontrollable flight systems were destroyed during landing in 1971. However, once on the ground, Martian dust storms present little hazard. Mars’ atmosphere has only about 1% the density of Earth at sea-level. Thus a wind with a speed of 100 km/hr on Mars only exerts the same dynamic pressure as a 10 km/hr breeze on Earth. The Viking landers endured many such events without damage. Humans are more than a match for Mars’ dragons.

2AC – A2: Psychological Harm

**You underestimate the human psyche – astronauts LIVE for this.**

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

4.4. Human Factors: In popular media, it is frequently claimed that the isolation and stress associated with a 2.5 year round-trip Mars mission present insuperable difficulties. Upon consideration, there is little reason to believe that this is true. Compared to the stresses dealt with by previous generations of explorers and mariners, soldiers in combat, prisoners in prisons, refugees in hiding, and millions of other randomly selected people, those that will be faced by the hand-picked crew of Mars 1 seem modest. Certainly psychological factors are important (Bishop 2010; Fielder & Harrison, 2010; Harrison & Fielder 2010; Suedfeld 2010). However, any serious reading of previous history indicates that far from being the weak link in the chain of the piloted Mars mission, the human psyche is likely to be the strongest link in the chain as Apollo astronauts have testified (Mitchell & Staretz 2010; Schmitt 2010).

2AC – A2: Zero-G hurts

Technological advancements solve

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

4.2. Zero Gravity: Cosmonauts have experienced marked physiological deterioration after extended exposure to zero gravity. However a Mars mission can be flown employing artificial gravity generated by rotating the spacecraft. The engineering challenges associated with designing either rigid or tethered artificial gravity systems are modest, and make the entire issue of zero-gravity health effects on interplanetary missions moot.

2AC – A2: Radiation

Radiation issues are already solved

Zubrin 2010 Robert Zubrin, austronautlical engineer, PHd, President of the Mars Society, Journal of Cosmology, October-November 2010, Human Mars Exploration: The Time Is Now, <http://journalofcosmology.com/Mars111.html>, DOA: 6/20/11 MG

4.1. Radiation: It is alleged by some that the radiation doses involved in a Mars mission present insuperable risks, or are not well understood. This is untrue. Solar flare radiation, consisting of protons with energies of about 1 MeV, can be shielded by 12 cm of water or provisions, and there will be enough of such materials on board the ship to build an adequate pantry storm shelter for use in such an event.The residual cosmic ray dose, about 50 Rem for the 2.5 year mission, represents a statistical cancer risk of about 1%, roughly the same as that which would be induced by an average smoking habit over the same period.

2AC – A2 Neg Turns

Space colonization means we survive global nuclear war, bioweapon use, and environmental destruction

Koschara 2001, **Major in Planetary Studies 1** (Fred, , L5 Development Group, http://www.l5development.com/fkespace/financial-return.html)

Potentially one of the greatest benefits that may be achieved by the space colonies is nuclear survival, and the ability to live past any other types of mass genocide that become available. We have constructed ourselves a house of dynamite, and now live in fear that someone might light a match. If a global nuclear war were to break out, or if a deadly genetic experiment got released into the atmosphere, the entire human race could be destroyed in a very short period of time. In addition, many corporate attitudes seem concerned with only maximizing today's bottom line, with no concern for the future. This outlook leads to dumping amazingly toxic wastes into the atmosphere and oceans, a move which can only bring harm in the long run. Humanity has to diversify its hold in the universe if it is to survive. Only through space colonization is that option available, and we had all best hope we're not too late

1NC Solvency Frontline (1/2)

1. Logistically, the mission is unsustainable

Mitchell and Staretz 2010 Edgar D. Mitchell, Sc.D.1, Robert Staretz, M.S., October-November, 2010, Journal of Cosmology, <http://journalofcosmology.com/Mars104.html>. Mitchel is the Apollo 14 Lunar module pilot. Sixth person to walk on the Moon. “Our Destiny – A Space Faring Civilization?” DOA: 6/20/11

Travel time is not our only problem though. Imagine the supplies needed and the problem of maintaining an appropriate sustainable environment for the crew for a 42 year one way trip. And then there’s the issue of keeping the ship operational for such a long period. Think of the energy requirements that would be needed to sustain such a trip just to keep the ships systems working let alone the energy requirements for the ship’s propulsion systems. For all these reasons plus several others we have not bothered to mention, many “experts” conclude that we are a very long way away from the practicality of embarking on such a trip. According to them our only hope of interstellar contact would be to stay at home and try to communicate with an alien civilization via some form of communication mechanism such as powerful narrow band radio or laser beams. And, even then the round trip delay of such a message to our closest neighbor would take about 9 years. Certainly this does not seem like an encouraging prospect for two-way interstellar communications. A monologue perhaps.

1. Research studies show that life cannot exist on Mars – no farming

Bailey 2006, Laura (cites Sushil Atreya, Professor of Atmospheric and Space Science at the University of Michigan) **‘06** “Mars' surface probably can't support life***”***August 14th, 2006 http://www.ur.umich.edu/0506/Aug14\_06/02.shtml

The question of whether the planet Mars can support life has entranced lay people and scientists for years. New research suggests that dust devils and storms on the Red Planet produce oxidants that would render its surface uninhabitable for life as we know it. "As a consequence, any nascent life (microorganisms, for example) or even prebiotic molecules would find it hard to get a foothold on the surface of Mars, as the organic material would be scavenged efficiently by the surface oxidants," says Sushil Atreya, professor in the Department of Atmospheric Oceanic and Space Sciences (AOSS). The results also explain inconsistencies in earlier space experiments that sought to determine if Mars had once or currently supports life. Mars is thought to have been created with the same ingredients that on Earth led to the formation of molecules associated with life. Yet, organic molecules never have been detected on Mars' surface, Atreya says. Atreya is lead author on one of two papers published last month in the journal Astrobiology that discuss the findings. Atreya's paper is called, "Oxidant Enhancement in Martian Dust Devils and Storms: Implications for Life and Habitability." The research was conducted by the AOSS, the Goddard Space Flight Center of NASA and the University of California, Berkley, with several other universities and institutes participating. The first Astrobiology paper calculated the excess carbon monoxide, hydroxyl and eventually hydrogen atoms produced when electric fields generated by dust devils and storms cause carbon dioxide and water molecules to split. Hydrogen and hydroxyl have been known to play a key role in the production of hydrogen peroxide in the Martian atmosphere. Gregory Delory, senior fellow at the Space Sciences Laboratory at UCLA, Berkeley, is first author of that paper, with co-authors Atreya and William Farrell of Goddard Space Flight Center, in Greenbelt, Md. The paper is called "Oxidant Enhancement in Martian Dust Devils and Storms: Storm Electric Fields and Electron Dissociative Attachment." Atreya's team calculated that the amounts of hydrogen peroxide produced during these reactions would be large enough to result in its condensation—essentially hydrogen peroxide would snow from the sky and contaminate the planet when it fell. Atreya's paper suggests that the hydrogen peroxide would scavenge organic material from Mars, and it could also accelerate the loss of methane on the planet, requiring a larger source to explain the recent detection of this gas on Mars. "Methane is a metabolic byproduct of life as we know it, but presence of methane does not by itself imply existence of life on a planet," Atreya says. Scientists regard Mars as Earth's closest relative. "Of all the planets in the solar system, Mars resembles the Earth most. And outside of the Earth, it has the best chance of being habitable now or in the past when the planet may have been warmer and wetter," Atreya says. Presence of life below the surface of Mars at any time is not ruled out by this research.

1NC Solvency Frontline (2/2)

1. Mars is too far from Earth

Williams 2010 (Lynda, M.S. in Physics and a physics faculty member at Santa Rose Junior College, “Irrational Dreams of Space Colonization”, Peace Review: A Journal of Social Justice, 22.1, Spring, pg 6)

A moon base is envisioned as serving as a launch pad for Martian expeditions, so the infeasibility of a lunar base may prohibit trips to Mars, unless they are launched directly from Earth or via an orbiting space station. Mars is, in its closest approach, 36 million miles from Earth and would require a nine-month journey with astronauts exposed to deadly solar cosmic rays. Providing sufficient shielding would require a spacecraft that weighs so much that it becomes prohibitive to carry enough fuel for a roundtrip. Either the astronauts get exposed to lethal doses on a roundtrip, or they make a safe one-way journey and never return. Regardless, it is unlikely that anyone would survive a trip to Mars. Whether or not people are willing to make that sacrifice for the sake of scientific exploration, human missions to Mars do not guarantee the survival of the species, but rather, only the death of any member who attempts the journey.

1NC GOTR Frontline (1/2)

1. Technology solves asteroid risk

Radice 2009 (Gianmarco Radice, Ph.D. Space Advanced Research Team University of Glasgow, UK, Avoiding Another Mass Extinction Due to N.E.O. Impact, Novermber 16th, 2009) <http://journalofcosmology.com/Extinction120.html> DOA: 6/20/11

Over the last decade the possibility of an asteroid, large enough to cause world-wide destruction, impacting the Earth has stimulated an intense debate among the scientific community on possible deflection methods. A large range of mitigation strategies have been proposed and compared in literature (Barbee and Nuth, 2009; Cambier et al., 2009; Crowther, 2009; Sanchez et al, 2009). The broad overview presented in this paper does not intend to rule out other possible methods not analysed here, although some could be considered as a combination of the methodologies introduced above. For the first time in the history of mankind, we have the technological capabilities and scientific know-how to protect ourselves from a catastrophe of truly cosmic proportions. We cannot rely on statistics alone to protect us from catastrophe; we cannot afford to wait for the first modern occurrence of a devastating NEO impact before taking steps to adequately address this threat. It is now time for mankind to develop practical and viable strategies to protect Earth from asteroid impact; if not we will go the way of the dinosaurs…

1. Solar Expansion is billions of years away – the short term impacts of the disadvantage outweighs

Universe Today 2009 (online space guide, cites studies done by several universities) **’09** “How Long Will Life Survive on Earth?” February 13th, 2009 <http://www.universetoday.com/25367/how-long-will-life-survive-on-earth/>

It feels like the Earth is forever. But we know it formed around 4.5 billion years ago, and it will last another 7.5 billion years or so, when the Sun becomes a red giant, and probably destroying the Earth. But our climate will become unlivable long before that. According to Peter Ward and Robert Brownlee, in their book, The Life and Death of Planet Earth, things are going to heat up much, much earlier. That’s because the energy output coming the Sun is gradually increasing. Not enough to change the climate in our lifetimes, or even millions of years. But in the span of hundreds of millions of years, things are going to heat up.

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1NC GOTR Frontline (2/3)

1. All impacts to warming are grossly exaggerated and have no impact – there is no proof warming is anthropogenic

Foster 6/16/2009 [Peter, award-winning journalist and author “300,000 non-deaths” National Post. Peter Foster, Climate change, Junk Science

http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/06/16/junk-science-week-peter-foster-300-000-non-deaths.aspx]

The Global Humanitarian Forum — former UN secretary-general Kofi Annan’s personal, Geneva-based NGO — will next week convene a conference devoted to “the significant and rapidly growing human impact of climate change.” We may be sure that Prof. Roger Pielke of the University of Colorado will not be among the invitees. That’s because he dubbed the alarmist report on which the conference is based “a methodological embarrassment and poster child for how to lie with statistics.” The GHF report and conference are part of the relentless diplomatic push ahead of the Copenhagen meetings in December at which a successor to Kyoto is meant to be hatched. Mr. Annan predicted “mass starvation, mass migration and mass sickness” unless there is agreement. The GHF’s report, titled “The Anatomy of a Silent Crisis,” claims that predominantly man-made climate change is already killing 300,000 people a year, and causing suffering to hundreds of millions, at an annual cost of US$125-billion. The impact is projected to get much worse, killing half a million annually by 2030. These claims have no basis in fact or science. Prof. Pielke pointed out that the report’s assertions fly in the face of even those meant to support it. He noted that the Geo-Risks group at Munich Re insurance (on some of whose projections the GHF report is based) earlier this year acknowledged that human-caused impact on natural disasters simply could not be seen. Moreover, no clear link was likely to be observed in the near future. The GHF report meanwhile itself acknowledges that “there is not yet any widely accepted global estimate of the share of weather-related disasters that are attributable to climate change.” So make one up. And emotionalize the issue with lots of colour pictures of poor people. Also, claim validation in the fact that “The frequency and intensity of weather-related disasters is often associated with climate change in public debate and common perceptions.” Even if those “perceptions” are entirely based on the type of alarmist junk peddled by the GHF. The figure of 300,000 is arrived at, according to Prof. Pielke by “an approach that is grounded in neither logic, science or common sense.” The report relies for most of its death projections on material from the World Health Organization (which has also admitted deep in the footnotes that the impact of anthropogenic climate change can’t be accurately measured). Nevertheless, using the WHO’s pick-a-number modelling approach, the GHF attributes 4%-5% of diarrhea deaths, 4% of malaria deaths and 4%-5% of dengue fever deaths (in 2010) to greenhouse-gas emissions. These percentages render absolute numbers that, more than suspiciously, exactly double the number of deaths projected in a 2003 WHO report. The remainder of deaths are attributed to bad weather, but again the figures are misleading. The report compares the number of “loss events” reported from earthquakes vs. weather disasters from 1980 through 2005 (the year of Hurricane Katrina). Then it draws nice straight trend lines (see graphic), notes that weather disaster loss events have increased relative to those due to earthquakes, and attributes the difference to climate change (since earthquakes obviously have nothing to do with climate change). But how much of the increased losses relate to increased insurance, and to increased building in weather-prone regions vs. earthquake-prone ones? More fundamentally, why should there be any correlation at all between earthquakes and the weather? Obviously, the notion that there are three times as many floods (as opposed to flood-related “loss events”) today than in 1980 is ridiculous, but that is the impression created by the report. The report also relies (almost inevitably) on the widely criticized Stern Review for its mammoth economic loss projections. However, not content with Lord Stern’s grossly doctored estimates of doom, the GHF report takes his assumptions about the adverse impact of a rise of 2.5C on GDP and doubles it! Prof. Pielke concludes that you can’t counter the GHF’s claims “because there is no data on which to adjudicate them. We can rely on hunches, feelings, divine inspiration, goat entrails or whatever, but you cannot appeal to the actual data record to differentiate these claims. So when people argue about them they are instead arguing about feelings and wishes, which does not make for a good basis for science.” That, nevertheless, is a very human way to look at things. For many people, climate change is a moral issue and thus the facts and the science are beyond question. Man-made climate change is unquestionably real, unquestionably bad and will hurt poor people most. That is all the platform needed by those motivated to posture on the side of the angels (and receive massive government funding, along with high personal status and power, for doing so). This alleged moral imperative ensures a drumbeat of worst-case scenarios, such as those presented yesterday in yet another — even more dangerous — report from the Obama White House, which is designed to influence Congress as it debates climate-change legislation.

1NC GOTR Frontline (3/3)

1. Space is unsustainable for humans – only earth can sustain life

Trevors 2009, J. (Trevors: University of Guelph and Adjunct Professor, a 28 year record of microbiology research, graduate and undergraduate teaching, consulting and editing/editorships has been achieved) **’09** *#* Springer Science + Business Media B.V. 2009 “The Earth Is the Best Place to Live” – http://www.springerlink.com/content/p68867688844p083/fulltext.pdf

The Earth is still the best planet to live despite our current problems/challenges of human population growth, total global pollution, global climate change, pandemics, wars, hunger and intolerance, to name a few examples. The universe has to be billions of years old to have sufficient time to produce the elements required for living organisms and their evolution. One would think that all humans would therefore take better care of the only known outpost of life in the universe. The Earth is the correct distance from our sun to maintain water in its liquid state (and gaseous and solid states) necessary for living organisms. Water has a low viscosity, high melting point, high boiling point and can act as a hydrogen donor and acceptor. Water can buffer against shifts in temperature. Water floats when it freezes and becomes ice, and reaches its maximum density at 4°C not at 0°C. These characteristics have immense importance for aquatic life. The size and mass of the Earth are correct for life. A small planet does not have sufficient gravity to hold an atmosphere such as ours. If the Earth was larger, the atmosphere would be denser and restrict light necessary for photosynthesis. No photosynthesis means no life as we know it on the Earth. The Earth is as good as it gets for the continued survival of all species, if humans simply reduce human population growth and the total pollution of the planet. This will require international cooperation and the efforts of all people, especially in the affluent developed countries that over pollute and over consume. The affluent countries must also provide the resources to assist less affluent countries with their basic human needs and rights. This is all doable if humans simply redirect efforts from conflicts and wars to international cooperation.

1. Earth is the ONLY outpost – we can solve challenges through population control, international cooperation, and pollution reduction

Trevors 2009, J. (Trevors: University of Guelph and Adjunct Professor, a 28 year record of microbiology research, graduate and undergraduate teaching, consulting and editing/editorships has been achieved) **’09** *#* Springer Science + Business Media B.V. 2009 “The Earth Is the Best Place to Live” – http://www.springerlink.com/content/p68867688844p083/fulltext.pdf

The already overpopulated Earth with several billion toomany people, consuming and polluting and entangled in complex conflicts for limited resources has no rationale present and future within the current paradigm. There is no future in conflicts, wars, violations of basic human rights and needs, competition, discrimination, lack of public infrastructure, hunger and poverty all entangled within pollution and global climate change. The challenges/ problems that we currently face can quickly turn into global crises (e.g. global warming, pandemics, overpopulation, food shortages) if the correct international actions are not implemented. The Earth is our only outpost. We can not travel quickly to other planetary locations and sustain life as we know it. Our correct choices are conservation, environmental protection, planned and managed human population control, international cooperation, evolve modern democracies and stable governments, education, basic human rights and needs and too all strive for the sanctity of life and humanity. The best way to halt total global pollution and climate change is to reduce total global pollution and the factors that cause climate change and overpopulation. What a wonderful world it will be.

1NC Inspiration Frontline

Good theory, no impacts –

1. Energy Shortages don’t cause instability or war – all theoretical with no empirical support

Van Der Windt, 2009, (Peter, Graduate Fellow at Columbia's Center for the Study of Development Strategies, April 28, 2009, (Oil Price Shocks and the Onset of Civil War, <http://www.columbia.edu/cu/polisci/pdf-files/miniapsavanderwindt.pdf>)

Figure 3 gives the probability for the onset of civil war for different values of ∆it. It is clear from the figure that something strange is going on; it seems likely that the result is driven by a few outliers. Returning to the data this observation seems to be correct. Out of the 4915 observations for ∆it only 17 of them are over 2,000 percent.29 As a robustness check I therefore rerun regression 3 excluding the observations for which ∆it > 2, 000. The results are given in regression 6 in table 5 in the appendix. While a change a domestic price shock still seems to have a positive effect on the onset of civil war its significance is gone. The bottom figure in figure 3 gives the simulation again. Indeed, the effect of an oil price shock on the onset of civil war is extremely small**.** Taking 2,000 as the cutoff value seems − and is − arbitrary. However, similar results are obtained if one takes any other value.30 6.3 Different environments Finally, I ran regression 3 by including the two different environments that were discussed in section 4.2. That is, by making use of variable RESi, I ran a regression that separates countries with oil reserves from countries without oil reserves. The results are given in regression 7 in table 5 in the appendix. In addition, by making use of variable RESi, I ran a regression that separates countries that are dependent on oil revenues from countries that are not. The results are given in regression 8 in table 5 in the appendix. We do not obtain shockingly new results. 7 Conclusion This paper looked at the potential effects of shocks in the price of natural resources on the onset of civil war; this is in contrast to previous large-N studies that solely look at the abundance or dependence of a country on natural resources. Theoretically there are reasons why we should expect that a sudden shock in the price of a country’s natural resource could trigger a civil war from one year to the next. By looking at the yearly change in the price of oil, I do not find evidence that an oil price shock leads to civil war.

1. Disease has no terminal impact – diseases are either too fast or too slow

The Independent 2003 [UK “Future Tense: Is Mankind Doomed?”, http://www.commondreams.org/headlines03/0725-04.htm 7/25/03]

Maybe - though plenty of experienced graduate students could already have a stab. But nature knows that infectious diseases are very hard to get right. Only HIV/Aids has 100 per cent mortality, and takes a long time to achieve it. By definition, lethal diseases kill their host. If they kill too quickly, they aren't passed on; if too slowly, we can detect them and isolate the infected. Any mutant smallpox or other handmade germ would certainly be too deadly or too mild. And even Sars killed fewer people worldwide than die on Britain's roads in a week. As scares go, this one is ideal - overblown and unrealistic.

1. Economic decline doesn’t cause war

Ferguson 2006 [Niall, Laurence A. Tisch Professor of History at Harvard University and a Senior Fellow at the Hoover Institution at Stanford. The next war of the world, Foreign Affairs. V 85. No 5.]

Nor can economic crises explain the bloodshed. What may be the most familiar causal chain in modern historiography links the great depression to the rise of fascism and the outbreak of World War II. But the simple story leaves too much out. Nazi Germany started the war In Europe only after its economy had recovered. Not all the countries affected by the Great Depression were taken over by fascist regimes, nor did all such regimes start wars of aggression. In fact, no general relationship between economics and conflict is discernible for the century as a whole. Some wars came after periods of growth, others were the cause rather than the consequences of economic catastrophe, and some sever economic crises were not followed by war.

1NC Impact Framing Frontline

1. Creating space colonies only saves a few people – not worth it – our evidence indicts their authors.

The Daily Galaxy 2009 The Daily Galaxy -Great Discoveries Channel is an eclectic text and video presentation of news and original insights on science, space, and the environment. The Daily Galaxy was founded by Val Landi. Val's background includes executive vice president of global technology-publisher IDG prior to joining Microsoft co-founder.) ’09 “Space Colonization: Future or Fantasy?” October 1st, 2009 http://www.dailygalaxy.com/my\_weblog/2010/08/space-colonization-the-human-future-or-scifi-fantasy.html

In an earlier Galaxy post we wrote that Stephen Hawking, world-celebrated expert on the cosmological theories of gravity and black holes who held Issac Newton's Lucasian Chair at Cambridge University until his recent retirement, believes that traveling into space is the only way humans will be able to survive in the long-term, while warning about the potential threat of actual alien contact with Earth. "Life on Earth," Hawking has said, "is at the ever-increasing risk of being wiped out by a disaster such as sudden global warming, nuclear war, a genetically engineered virus or other dangers ... I think the human race has no future if it doesn't go into space." Another of his famous quotes reiterates his position that we need to get off the planet relatively soon. "I don't think the human race will survive the next 1,000 years unless we spread into space." The problems with Hawking’s solution is that while it may save a “seed” of human life- a few lucky specimens- it won’t save Earth’s inhabitants. The majority of Earthlings would surely be left behind on a planet increasingly unfit for life**.**

1. The gains of human missions to Mars are unsustainable and intangible – it’s too visionary

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 6/20/11 MG

However realistic or important these benefits may be, they are the windfalls of discovery, not its object. To say that we should spend a trillion dollars to send astronauts to Mars in order to employ engineers and develop spin-offs is like saying that we built the Empire State Building because of its excellent views of Manhattan. The promise of jobs and new patents may temporarily boost Congressional and public support, but they will not sustain it; they do not offer a compelling motive that would support such projects over the long haul. Sending humans to Mars requires a vision of exploration that convincingly explains why we should place humans at the center of an exploration program despite risk and expense (Logsdon 2003). For the pro-human camp, making this case is difficult. The core aims of Mars human missions attach to goals that are hard to measure: ensuring the survival of the species, inspiring new generations, fulfilling a human destiny to explore, or fostering social or biological evolution. While all of these goals are important, they are visionary, long-term, or intangible. As such they are tricky to assess as matters of policy. How much would a Mars human space program inspire young people? What are the key threats to our species survival? Would they best be met by sending humans to Mars? What is the metric for measuring exploration as a creative or evolutionary activity?

1. Short term impacts matter more than their vague and futuristic vision

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 6/20/11 MG

In short, the debate over Mars is really a debate over the nature of exploration itself. It will not be solved by news designs for booster or crew capsules. While robotic missions may not generate the excitement of human ones, they have become a proven means for gathering data about Mars at reasonable cost. What would human missions give us? Advocates have not effectively made their case. Too often, they have gotten lost in the estuaries of Mars debate: on the benefits of future technological spin-offs, new aerospace engineering jobs, or a national advantage in space.

DeDev Turn

Economic growth causes environment degradation – turns your resource wars and global warming scenario

Booth 1995 Douglas E. Booth, professor of economics at Marquette University, 1995 (“Economic Growth and the Limits of Environmental Regulation: A Social Economic Analysis”, Review of Social Economy, Vol. 54)

After a quarter century of environmental regulation in this country under the auspices of the Environmental Protection Agency and other government agencies, significant environmental threats remain. Ambient standards for ozone and other air pollutants are frequently violated in urban areas, lakes and rivers continue to be heavily polluted, groundwater is increasingly threatened with contamination, ambient levels of toxic chemicals in the biotic food chain are at high levels, little has been done about the potentially serious problem of greenhouse warming, and biodiversity is threatened as a consequence of reduced and fragmented natural habitats. Why has the regulatory system failed to fully address our environmental problems? The goal of this paper is to suggest that the roots of environmental problems, and the failure of environmental regulation, are deeply embedded in the processes that generate economic growth. The logic of the argument to be presented will take the following form: long-run economic growth relies on the creation of new industries and new forms of economic activity; these new forms of economic activity create new kinds of environmental problems; and new forms of economic activity constitute vested political interests that oppose environmental regulation. Each of the three main sections of the paper will provide theoretical and empirical justification for each component part of the basic argument.

Environmental destruction results in extinction

Kuafmann 1981 Les Kaufmann 81, Chief Scientist at Edgerton Research Lab, THE LAST EXTINCTION, 1981, p. 4

The fourth argument for preserving biological diversity is the simplest: Our lives depend on it. We are part of a common fabric of life. Our survival is dependent on the integrity of this fabric, for the loss of a few critical threads could lead to a quick unraveling of the whole. We know that there have been previous mass extinctions, through which some life survived. As for our own chances of surviving this mass extinction, there can be no promises. If the Grim Reaper plays any favorites at all, then it would seem to be a special fondness for striking down dominant organisms in their prime. David Joblinski examines the fates of rudist dames, mammalike reptiles, dinosaurs, and a host of other scintillating but doomed creatures in his essay. Humans are now the dominant creatures, at least in terms of their influence. So, lest history bear false witness and barring some serious conservation efforts on our part, this mass extinction could well be the last one that we will ever know about.

Space Disease Turn

Space travel spreads virus epidemics.

Britt 2000 Robert Roy Britt 2k, Senior science writer, managing editor of LiveScience, 1/21/2k http://www.space.com/scienceastronomy/planetearth/flu\_in\_space\_000121.html

So say Sir Fred Hoyle and Chandra Wickramasinghe of the University of Wales at Cardiff. And while there is much doubt by many other scientists that the flu comes from space, Hoyle and Wickramasinghe are generating a lot of interest with their idea. In a new paper, to be published in an upcoming issue of the Indian journal *Current Science*, the researchers present data that show how previous periods of high sunspot activity coincided with flu pandemics (large-scale epidemics). A roughly 11-year cycle of solar activity is increasing now and is expected to peak soon, other scientists agree. Hoyle and Wickramasinghe say we can expect another flu pandemic to accompany the solar peak "within weeks." By that claim, perhaps debate over their research will soon be settled. Injecting the flu into our atmosphere The researchers say that the virus, or a trigger that causes it, is deposited throughout space by dust in the debris stream of comets, which are thought by many researchers to harbor organic material. As Earth passes through the stream, dust (and perhaps the virus) enters our atmosphere, where it can lodge for two decades or more, until gravity pulls it down.

Space exploration brings new strains of space viruses.

Gagnon 1999 Bruce K. Gagnon 99 “Space Exploration and Exploitation” Global Network against Weapons and Nuclear Power in Space, http://www.space4peace.org/articles/scandm.htm

Potential dangers do exist though. Barry DiGregorio, author and founder of the International Committee Against Mars Sample Return, has written that "…any Martian samples returned to Earth must be treated as biohazardous material until proven otherwise." At the present time NASA has taken no action to create a special facility to handle space sample returns. On March 6, 1997 a report issued by the Space Studies Board of the National Research Council recommended that such a facility should be operational at least two years prior to launch of a Mars Sample Return mission. Reminding us of the Spanish exploration of the Americas, and the smallpox virus they carried that killed thousands of indigenous people, DiGregorio warns that the Mars samples could "contain pathogenic viruses or bacteria."

Mars specifically has been scientifically proven deadly.

Hawkes 2004 Nigel Hawkes, journalist, 12/3/04 [ “The Threat from Life on Mars,” THE TIMES, December 3, 2004, http://www.surfingtheapocalypse.net/forum/index.php?id=38418]

Earth’s defenses may need to be boosted against risk of potentially deadly microbes returning on space probes EARTH must take precautions to avoid contamination from lifeforms that must now be presumed to exist on Mars, leading scientists gave warning yesterday. Potentially deadly microorganisms could be returned to Earth on a probe which is being planned to collect samples from the Martian surface. The warning comes after a detailed scientific analysis of data sent back by the roving vehicle Opportunity which landed on Mars on January 25. Jeffrey Kargel of the US Geological Survey said that protection of our own planet from alien forms of life requires the assumption that Martian life exists. Before proceeding with sample returns or human missions to Mars, we must review measures for planetary biological protection.

Spending Link

Human Missions to Mars are exceedingly expensive

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 6/20/11 MG

The divide over Mars is deep. It extends to basic beliefs about the meaning of exploration. While a scientific vision of Mars, with a focus on tele-robotic exploration, may not excite the public, it is achievable within the current fiscal climate. Moreover, the value of such tele-robotic missions can be measured by the amount and significance of data gathered. By contrast, human missions to Mars will be exceptionally expensive and will rely upon long-term, intangible, and visionary arguments that are much more difficult to assess. In the past, advocates of human spaceflight have relied upon historical analogies to make their case, even when those analogies have been faulty and simplistic. So where do we go from here? Should we send humans to Mars? The case still needs to be made. One thing is clear: humans will not reach Mars on the power of peripheral arguments about science, national pride, or technological spin-offs. Advocates of a human program need to articulate the core values of human spaceflight and justify their missions accordingly, even if they are difficult to measure.

Cooperation DA (1/3)

1. Unique Link – Europe and NASA cooperating on Mission to Mars now – plan represents immediate and independent action that severs cooperation.

European Space Administration 2011 (Its Europe’s NASA… enough said, “The enigma of methane on Mars”) <http://exploration.esa.int/science-e/www/object/index.cfm?fobjectid=46038>) DOA: 7/5/11 MG

Observations from the Planetary Fourier Spectrometer (PFS) on ESA's Mars Express and from very high spectral resolution spectrometers on ground-based telescopes, have detected variable amounts of methane in the atmosphere of Mars. Could this be evidence for life on Mars? International space agencies are planning an ambitious, long-term Mars Robotic Exploration Programme to find a definitive answer to this most enduring question. The scientific objectives of the joint ESA/NASA ExoMars programme 2016-2018 include: searching for signs of past and present life on Mars, studying the water and geochemical environment as a function of depth in the shallow subsurface, and investigating Martian atmospheric trace gases and their sources. To achieve these objectives, the 2016 ESA-led ExoMars Trace Gas Orbiter, one of two missions in the ExoMars programme, will measure and map methane and other important trace gases with high sensitivity to provide insights into the nature of the source through the study of gas ratios and isotopes. The 2018 ESA ExoMars Rover will search for two types of life signatures, morphological and chemical, with an accurate study of the geological context. Morphological information related to biological processes may be preserved on the surface of rocks or under the surface. Since the surface of Mars is oxidised, the ExoMars drill has been designed to penetrate the surface and obtain samples from well-consolidated (hard) formations, at various depths, down to 2 m.

1. Internal Link – Actions following the new NSP determine the fate of space exploration. Independent action now collapses international cooperation.

Samson 2010 - (Victoria Samson, Secure World Foundation Washington Office Director , “The 2010 Obama Space Policy: Sustainability, International Engagement and Stability in Space,” Secure World Foundation, Sept. 29, 2010, Pg. 7-8 <http://swfound.org/media/1759/obama_spacepolicy_analysis_vs.pdf/>) DOA: 7/05/2011 MG

The Obama administration's new NSP clearly identifies the core challenges and priorities of space security and sustainability for the United States and provides the policy framework to allow the United States to deal with those challenges. However, much depends on how the branches of the U.S. government carry out the mandates presented in the new NSP. The Space Posture Review, being worked on at present by the Department of Defense and the Office of the Director of National Intelligence, will provide some insight on how the United States intends to implement the NSP’s guidelines when the Space Posture Review is released, potentially later this year. The Obama administration’s Fiscal Year 2012 budget request, scheduled for release in early February 2011, will give some indication of the programmatic actions that can result from the new NSP. Efforts by the State Department will further illustrate whether or not the United States is truly serious about international cooperation or if Washington is only paying lip service to the concept. The NSP sets the stage for potentially long‐lasting effects that will allow the world to continue enjoying benefits from space. As the international space community continues to move towards creating and sustaining a stable outer space environment, it has the opportunity to use the NSP as both a guide post and as a starting point for international discussions for how best to do so. This major opportunity should not be bypassed.

Cooperation DA (2/2)

1. Impact – Lack of coop risks multiple earth and space wars – turns case and causes extinction.

Huntley et al 2010 – US Naval Postgraduate School [Wade L. Huntley, Joseph G. Bock (Kroc Institute for International Peace Studies, Notre Dame) & Miranda Weingartner (Weingartner Consulting), “Planning the unplannable: Scenarios on the future of space,” Space Policy, Volume 26, Issue 1, February 2010, Pages 25-38//edlee]

4.3. Scenario A: “Back to the Future” - “Back to the Future” describes a future characterized by a high degree of technological breakthrough wherein power is projected by rule of force. In 2009 global tensions create an atmosphere where nations increasingly test new defensive technology. In 2010 India explodes a satellite out of Low-Earth orbit (LEO) and the USA tests an orbital interceptor. Gazprom invests $1 billion in the development of a nanotechnology research lab. There is also a steady erosion of Outer Space Treaty norms and limits to protect commerce. By 2013 NATO is dissolved, seen as no longer relevant. The EU alliance shifts towards defending its borders. Human spaceflight continues, in an increasingly competitive atmosphere. The USA launches Aries I, with a crew. Generation Y seems more interested in environmental issues than space. By 2014 many nations begin deploying anti-satellite (ASAT) technology. In 2015 China, the USA, India and Russia field rival ASATs in orbit, as LEO orbits are at risk from debris. Commercial interests give up on LEO and eye the Moon, which fuels the race to establish a presence there. An increasingly protectionist USA leaves the World Trade Organization (WTO). In response, China recalls its debts from the USA. Meanwhile, European and Asian growth continues and, in 2018, a Chinese factory begins production of bulk carbon nanotubes. The USA and China race to produce the first space elevator. The civil lunar programs move forward. By 2020 a joint US–EU team land on and ‘reclaim’ the Moon. Lunar bases and the space elevator are established, as resources continue to dwindle on earth. Rival moon bases compete over mining rights and orbital lasers promote a defensive arms race in space. NATO is replaced by a new European Defence Organization (EDO). A coalition emerges, including the USA, the EU and India, in opposition to Russia and China. By 2025 African nations reject the influence of major powers and, thanks to the proliferation of technology, become space powers in their own right. In 2028 major powers withdraw from the Outer Space Treaty. Saudi oil fields are now officially empty, and the lunar colonies' major export is solar power. Military bases on the Moon defend against rival solar farms. A Russian–Chinese coalition attacks the space elevator, which essentially strands the US–EU lunar colonies and seriously impairs energy availability on Earth. The UN breaks down and is dismantled. Treaties are ignored and tensions increase. The earth is highly militarized, and conflict occurs both on earth and in space. The future is tense, dark and uncertain. By 2030 Californian scientists claim to have discovered an alleged artificial signal from outer space. The signal offers the possibility of a new reason for hope. 4.4. Group observations on Scenario A In this scenario technological breakthroughs add to the rule of force rather than providing a means for international cooperation. States come together and drift apart based on their perceived interests. The group acknowledged the importance of “giving teeth” to the Outer Space Treaty and other treaties in order to enhance means of overcoming conflict in the future. However, treaties do erode when states or blocs of states perceive these no longer to serve their interests. Further, norms of the Outer Space Treaty may be eroded through the commercialization of space, rather than by conflict and militarization. The group recognized that cooperation is possible on some, but not all, issues. Following the Chinese recent ASAT test there were efforts to clarify the situation for all parties concerned and prevent repeat occurrences. This suggests in part that the UN breaking down is not realistic, and that there might be greater political will to move in a collaborative direction than the scenario suggests. The competition for resources breaks down liberal order and traps states into a situation where the rule of force is perceived as the only option. In this scenario democracies are not less likely to militarize. Politicians bear the responsibility for the implications of their actions. NASA remains a remnant of the Cold War, while the EU space plan is geared towards a broader array of concerns. The voice of civil society is then squashed. (There is also an option of a scenario where, instead of the EU, China becomes a regional champion, bringing other regional leaders like Brazil under a new transparent framework.) The rule of force is also justified for the protection of investments. An entity such as the US-Soviet Standing Consultative Commission (SCC), which was convened when one side thought there had been a violation by the other, might be helpful. Driving factors come not necessarily from the bottom or the top, but rather from mid-level officials who can promote a discussion on the consequences of space weaponization. It is important to reach out to the non-space community, to help a wider constituency relate to the issues and take greater interest. Getting away from focusing on big, one-off, prestige programs is one way to elicit such an interest. Technological innovation, while important, does not necessarily lead to an advantage for the country of origin. Rapid dissemination of technologies among a certain community can affect the security of the countries of origin. For this reason, if weaponization of space is inevitable, countries should operate as much as possible in a collaborative, transparent fashion. This suggests the utility of a global regime controlling the technology. Cooperative leadership among youth could be developed to help ensure future cooperation. This group underlines the importance of reaching young people today in order to stimulate awareness in the next generation of leaders of the negative spirals that could develop. All parties must be made aware that it is in no one's interest to attack each other's satellites; both sides need the information and need freedom to access space. A non-interference pact could be developed, which might name the kinds of weapons not to be used.

Robots CP

[For Net Benefit, but any of the case turns either after solvency or on case and make sure to identify them as NB in the 2NC]

Text: The United States federal government should provide all necessary funding to the National Aeronautics and Space Administration (NASA) for robotic exploration and development missions to establish United States colonies on Mars.

Observation One is the Competition: The plan specifies a HUMAN mission to Mars. The Counterplan uses Robots to avoid and solve DA to immediate human exploration.

Observation Two is Solvency:

First, telerobotic exploration is more feasible, currently economically possible, and avoids the risk to humans inherent in the plan.

Robinson 2010 **Michael Robinson, Ph.D.**  University of Hartford, **2010,** The Problem of Human Missions to Mars, Journal of Cosmology, October-November, <http://journalofcosmology.com/Mars134.html>, DOA: 7/05/11 MG

Why should we explore Mars? In debating an answer to this question, the space community has revealed a deep divide: one that extends beyond policy to touch at the basic meaning of exploration. While a scientific vision of Mars, with a focus on telerobotic exploration, may not excite the public to the same extent as human missions, it is achievable within the current fiscal climate. Moreover, the value of such tele-robotic missions can be measured by the amount and significance of data gathered. By contrast, human missions to Mars will be exceptionally expensive and will rely upon long-term, intangible, and visionary arguments that are much more difficult to assess. This essay argues that humans will not reach Mars on the power of peripheral arguments about science, national pride, or technological spin-offs. Advocates of a human program need to articulate the core values of human spaceflight and justify their missions accordingly, even if they are difficult to measure.

Second, empirics are on our side – human missions repeatedly fail and distract from scientific exploration – probes work better

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For example, many space scientists express frustration with human space flight, which they view as an expensive distraction from scientific exploration (Launius 2006, Lester 2010) Lower costs, improvements in computer design and miniaturization, and the proven durability of Martian probes have encouraged their faith in robotic science and made arguments for sending astronauts to Mars less compelling (American Physical Society 2004). By contrast, many supporters of human missions to Mars believe that the focus on science and robotic exploration has become too narrow, ignoring the deeper meanings of exploration, its capacity to inspire people today, and shape the societies of tomorrow.

2NC Robots CP Ext.

The counterplan is grounded in Mars specific experience – prefer proven science to utopian thinking.

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In short, the debate over Mars is really a debate over the nature of exploration itself. It will not be solved by news designs for booster or crew capsules. While robotic missions may not generate the excitement of human ones, they have become a proven means for gathering data about Mars at reasonable cost. What would human missions give us? Advocates have not effectively made their case. Too often, they have gotten lost in the estuaries of Mars debate: on the benefits of future technological spin-offs, new aerospace engineering jobs, or a national advantage in space. However realistic or important these benefits may be, they are the windfalls of discovery, not its object. To say that we should spend a trillion dollars to send astronauts to Mars in order to employ engineers and develop spin-offs is like saying that we built the Empire State Building because of its excellent views of Manhattan. The promise of jobs and new patents may temporarily boost Congressional and public support, but they will not sustain it; they do not offer a compelling motive that would support such projects over the long haul. Sending humans to Mars requires a vision of exploration that convincingly explains why we should place humans at the center of an exploration program despite risk and expense (Logsdon 2003).